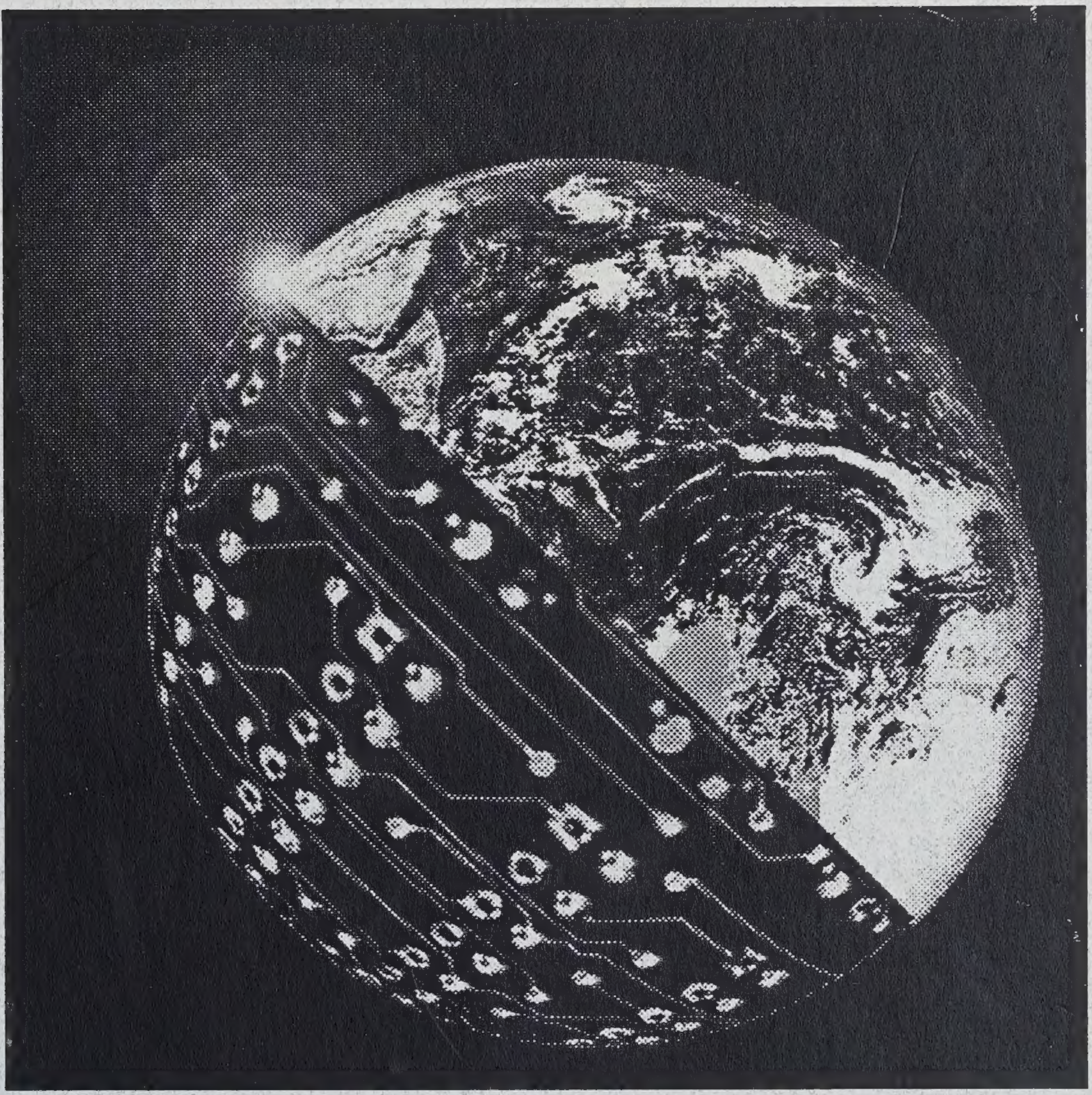
THE MERIT NETWORKING SEMINARS

Making Your Internet Connection Count:
Technology, Tools & Resources

October 19-20, 1992
Ann Arbor, Michigan

Sponsored by Merit Network, Inc.



Merit Network, Inc.

Merit Network, Inc., has over twenty years of experience in research and education networking. In 1966, Merit was founded by a partnership of three Michigan public universities as a not-for-profit organization to pioneer a state-wide computer resource-sharing network for Michigan universities. A consortium which has grown to nine state universities and 41 affiliate organizations, Merit runs MichNet, the oldest of the regional networks attached to NSFNET.

In 1987, the National Science Foundation awarded a cooperative agreement to Merit for the re-engineering and management of the NSFNET, the principle academic and research backbone network of the Internet. Merit worked in partnership with MCI, IBM, the State of Michigan, and later Advanced Network & Services, Inc. (ANS), on the NSFNET project demonstrating the effectiveness of coalescing government, higher education, and business and industry to advance the national agenda for research and education.

As part of its commitment to network support services, Merit began the Merit Networking Seminar series in 1988. Other support services provided by Merit include online information services, consulting, training, and publications.

If your site is interested in hosting a future Merit Networking Seminar or in having a Merit staff member speak at your seminar, please contact Merit Network, Inc. at

Merit Network, Inc.
2901 Hubbard Pod G
Ann Arbor, MI 48105-2016
(313) 936-3000

NSFNET-info@merit.edu

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Making Your Internet Connection Count:
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DAY ONE	**Monday, October 19**
8:00 - 8:30	Registration and Refreshments, Michigan League, University of Michigan
8:30 - 8:45	Welcome and Announcements
8:45 - 9:30	**Keynote Address—NREN Update** Mike Roberts Vice President for Networking EDUCOM
9:30 - 10:15	**NSFNET—Your Highway to National Networking** Ellen Hoffman, Manager, Network Information Services Merit Network, Inc.
10:15 - 10:30	Break
10:30 - 11:15	**Navigating the Internet: An Information Services Cruise** Laura Kelleher, Coordinator, Network Applications Merit Network, Inc.
11:15 - 12:00	**Navigating the Internet: Network Tools for Document Delivery** Mark Davis-Craig, Coordinator, Information Sources Merit Network, Inc.
12:00 - 1:30	Lunch — Computer Room Open
1:30 - 2:15	**Community Access—the National Public Telecomputing Network** Tom Grundner, President, National Telecomputing Network Cleveland Free-Net
2:15 - 3:00	**National Library Resources at Your Fingertips** Ron Larsen, Associate Director for Information Technology University of Maryland Libraries
3:00 - 3:15	Break
3:15 - 4:45	*Concurrent Sessions: question & answer / discussion format - choose one:*
3:15 - 4:45	**Gigabit Technology Update** Phill Gross, Vice President, Network Technology Advanced Network & Services, Inc. Chairman, Internet Engineering Task Force Member, Internet Activities Board
3:15 - 4:45	**Use of Online Information by Library Patrons and Librarians** Karen Drabenstott, Associate Professor School of Information and Library Studies University of Michigan
4:45 - 5:30	Open Computer Room
7:00 - 8:00	Reception, Campus Inn

DAY TWO	**Tuesday, October 20**
8:15 - 8:30	Welcome and Announcements
8:30 - 9:15	**Weather Underground** Jeff Masters, Creator of UM Weather Underground University of Michigan
9:15 - 10:00	**Commercial Aspects of the Internet** John Duhring WAIS Project
10:00 - 10:15	Break
10:15 - 11:30	*Concurrent sessions - question & answer / discussion format - choose one:*
10:15 - 11:30	**Introduction to Internetworking and TCP/IP** John Scudder, Internet Engineer Merit Network, Inc.
10:15 - 11:30	**Network Access and Use by K-12 Schools:** **Project Connect: Connecting K-12 Netware Servers to the Internet** Dana Sitzler, K-12 Outreach Coordinator Merit Network, Inc. **Interactive Communications and Simulations** Clancy Wolf, School of Education University of Michigan
11:30 - 11:45	Break
11:45 - 12:30	**Internetworking Futures** Douglas E. Van Houweling Vice Provost for Information Technology University of Michigan Chairman, Advanced Network & Services Board of Directors
12:30 - 1:30	*Lunch — Computer Room Open*
2:30 - 5:30	**Hands-on tutorial: (extra fee)** Learning how to use mail, telnet, ftp, Gopher, and WAIS for effective information access School of Public Health, University of Michigan

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NREN Update

Mike Roberts
Vice President for Networking
EDUCOM

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https://archive.org/details/meritnetworkings00mike_0

BIOGRAPHICAL NOTES

Michael M. Roberts
Vice President, Networking
EDUCOM

Mike Roberts is Vice President, Networking at EDUCOM, where he also directs the EDUCOM Networking and Telecommunications Task Force, a group of sixty universities and major corporations with allied interests in computer networks for research and education.

He also serves currently as the Executive Director of the Internet Society, a professional organization established in 1992 to promote the use of the Internet as a worldwide communications network for the advancement of research and education.

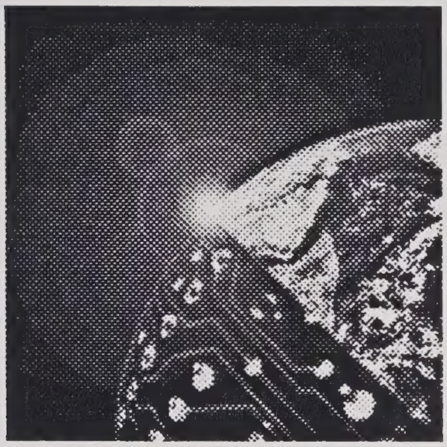
Prior to joining EDUCOM, he was Deputy Director for Information Technology Services at Stanford University.

He holds graduate and undergraduate degrees from Stanford University.

He has published extensively on computer networks and networking policy, and has testified on behalf of higher education in Congressional hearings on networking and telecommunications.

He has been active in professional development of information technology in higher education and was a founding member and the first president of CAUSE, a technology management association for colleges and universities.

THE MERIT NETWORKING SEMINARS



NSFNET

Your Highway to National Networking

Ellen Hoffman
Manager, Network Information Services
Merit Network, Inc.

BIOGRAPHICAL NOTES

Ellen Hoffman
Manager, Network Information Services
Merit Network, Inc.

Ellen Hoffman has been the Manager of Network Information Services (NIS) for Merit Network, Inc. and the University of Michigan since 1991. NIS is the group that provides technical support, consulting, education, documentation, public relations, and online reference services for the NSFNET backbone project, MichNet and UMnet. Prior to her current position, Ms. Hoffman served as the Assistant to the President of Merit. She initially joined the Merit staff as one of the first members of the NSFNET project team in the role of Documentation and Public Relations Coordinator in 1987.

Prior to working on NSFNET related projects, Ms. Hoffman worked as Education Coordinator for the University of Michigan Computing Center. She has over 20 years of experience in computers, publications and wide-area networking and has been in user support for over 10 years. She has worked as an editor for a number of general and academic publications, as an audiovisual consultant in a multi-media library, and a computer instructor in an elementary school. Ms. Hoffman is currently co-chair of the IETF User-Doc Working Group and a member of all IETF User Services Working Groups. Ms. Hoffman is a member of the FARNET user services group and the Coalition for Networked Information directories group.

Ms. Hoffman graduated from the University of Michigan in 1972 with a Bachelor of General Studies Degree. She received a Master of Science degree in journalism and a Masters of Science in archaeology/anthropology from Michigan in 1979, and pursued doctoral studies in anthropology from 1979-1987.

Can you define

"NETWORK"?

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- What is the Internet?

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What is internetworking?

- An internetwork is a network of networks (of networks . . .)
- All these share a common language, procedures (Protocols)

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How does it work?

Structure of the Internet

- Hosts—systems where applications run
- Routers
  - Forward chunks of data ("packets") to their destination
  - Communicate with other routers to determine paths
  - Completely ignorant of applications
  - Connected by circuits from telecomms

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Before 1985

The ARPAnet

- 1969 - Mid '70s - ARPAnet established by DARPA
- Access to remote computers is effective
- 1980 - Use of TCP/IP protocol suite begins
- 1983 - DARPA mandates use of TCP/IP
- 1984 - ARPAnet partitioned
  MILnet - DOD production traffic
  Arpanet - research traffic
- ARPAnet very congested by 1985 - remote computer access no longer effective

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- What is NSFNET?

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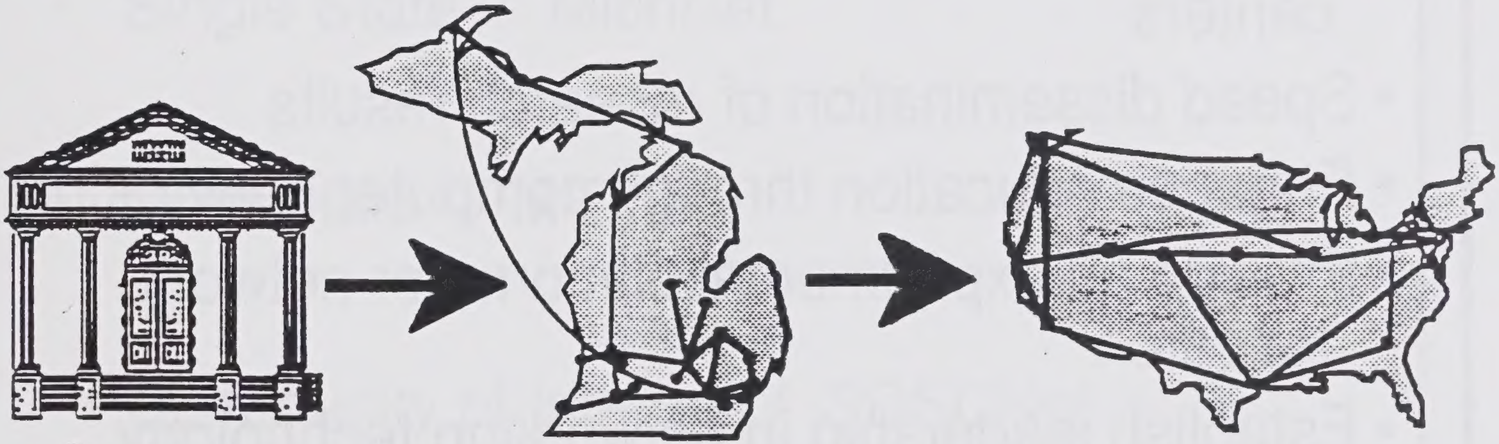
NSFNET is a Network of Networks



Campus or
institutional
networks

State or regional
networks

National backbone
network

What is the purpose of NSFNET?

- Advance scientific collaboration on a national scale
- Widen access to NSF funded supercomputer centers
- Speed dissemination of research results
- Enhance education through computer networking
- Provide an experimental platform for network research
- Establish leadership in networking technology

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Midlevel Networks

- Metropolitan Area / BARRNet
- Single State / MichNet
- Multi-State / MIDnet
- Community of Interest / SDSCNet

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"Campus" networks

Examples from MichNet:

- College: Michigan State University
- Multi-campus college: University of Michigan-Ann Arbor, Dearborn, Flint
- Research Organization: Great Lakes Environmental Laboratory
- K-12 School: Mumford High School, Detroit
- Affinity Group: Michigan Library Consortium
- Health Care: Henry Ford Hospital
- Commercial: Upjohn
- Government: U.S. Army Tank & Automotive Command

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— Merit Network, Inc.

NSFNET

— ANS — IBM — MCI

The State of Michigan
The National Science Foundation

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NSFNET Backbone 1985-1987

Interim NSFNET Backbone

- 1985 - Five additional supercomputer centers established by the National Science Foundation
- 1986 - 56 Kbps backbone connects the six NSF-funded supercomputer centers
- 1986 - NSF provides seed money for a dozen regional networks
- 1987 - Federal Coordinating Committee (FCCSET) reports to the Office of Science and Technology Policy the need for high performance computing and a national research and education network

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NSFNET Backbone 1987 - 1992

NSF Solicitation for "New" Backbone

- Nov 87 - contract awarded to Merit and its partners, IBM, MCI, and the State of Michigan
- July 88- Phase 1 T1 backbone operational
- July 89 - Phase 2 T1 backbone operational
- Dec 90 - First link of T3 (45 Mbps) backbone operational
- Oct 91 - All NSFNET sites installed at T3
- Jan 92 - Traffic cutover begins

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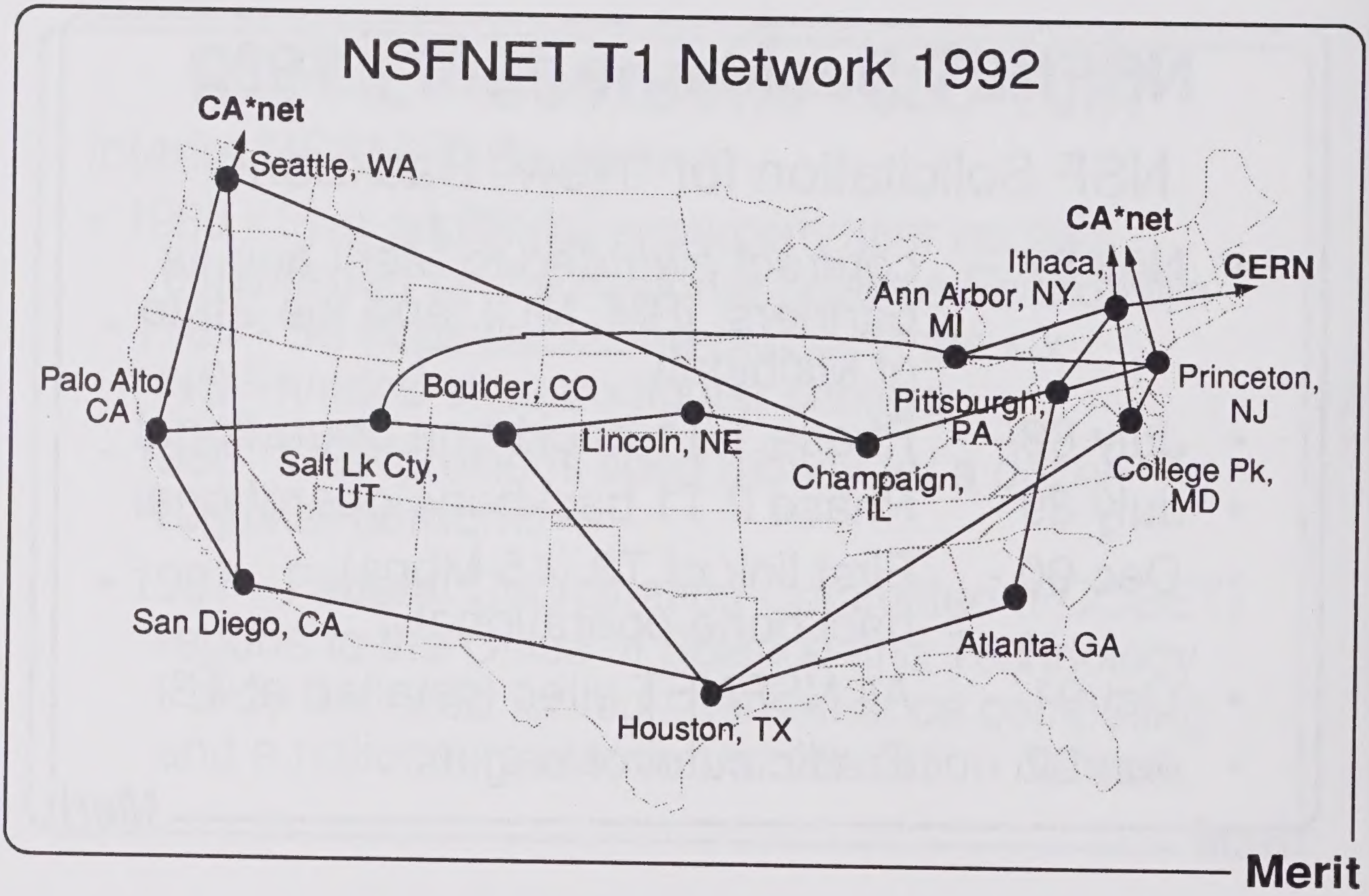
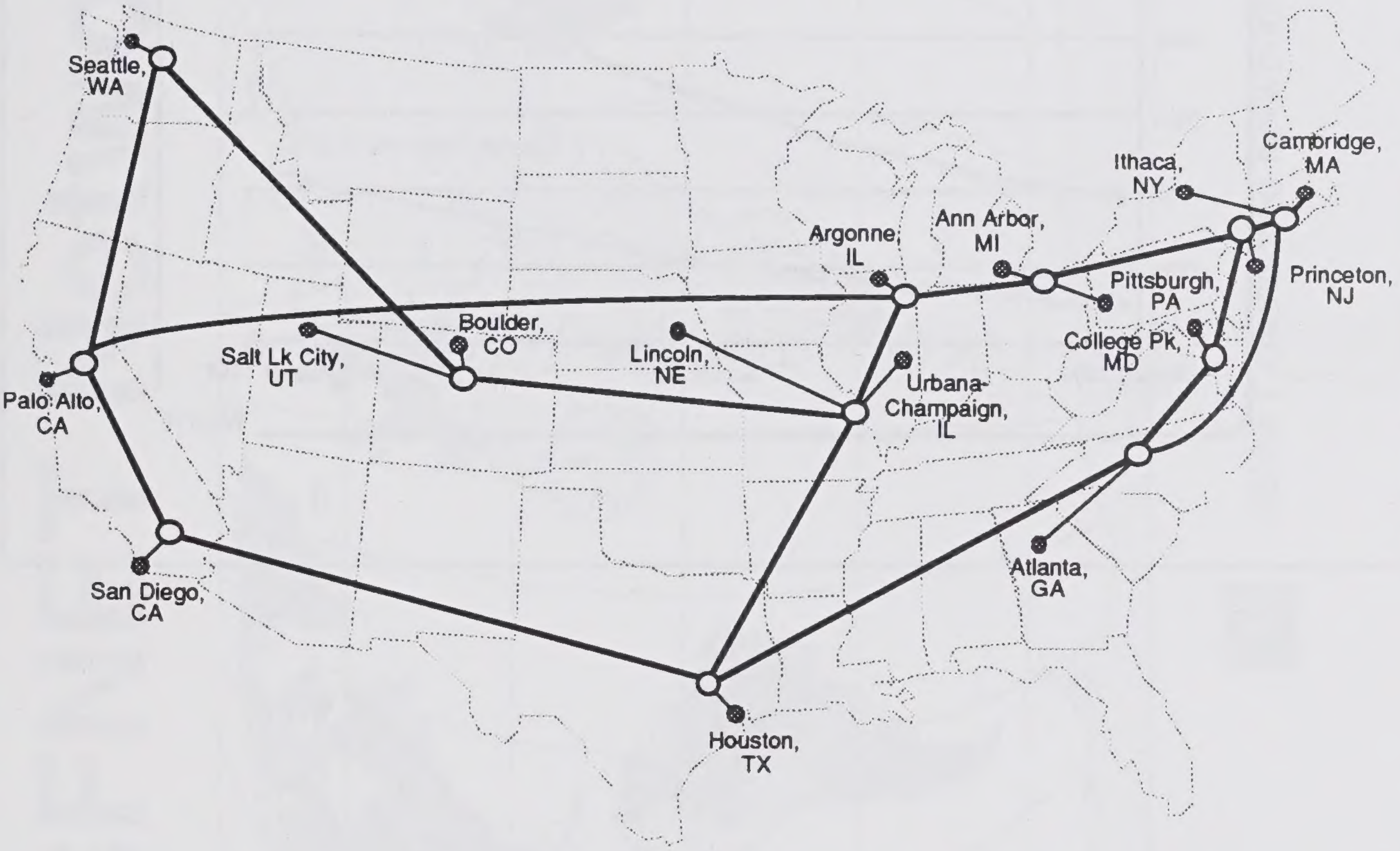

NSFNET T1 Network 1992
CA*net
Seattle, WA
Palo Alto, CA
Boulder, CO
Salt Lk Cty, UT
Lincoln, NE
Champaign, IL
Ann Arbor, MI
Ithaca, NY
CA*net
CERN
Princeton, NJ
Pittsburgh, PA
College Pk, MD
Atlanta, GA
San Diego, CA
Houston, TX
Merit

NSFNET Backbone Service (T3) 1992


Seattle, WA
Palo Alto, CA
San Diego, CA
Salt Lk City, UT
Boulder, CO
Lincoln, NE
Houston, TX
Argonne, IL
Urbana-Champaign, IL
Ann Arbor, MI
Pittsburgh, PA
Ithaca, NY
Cambridge, MA
Princeton, NJ
College Pk, MD
Atlanta, GA

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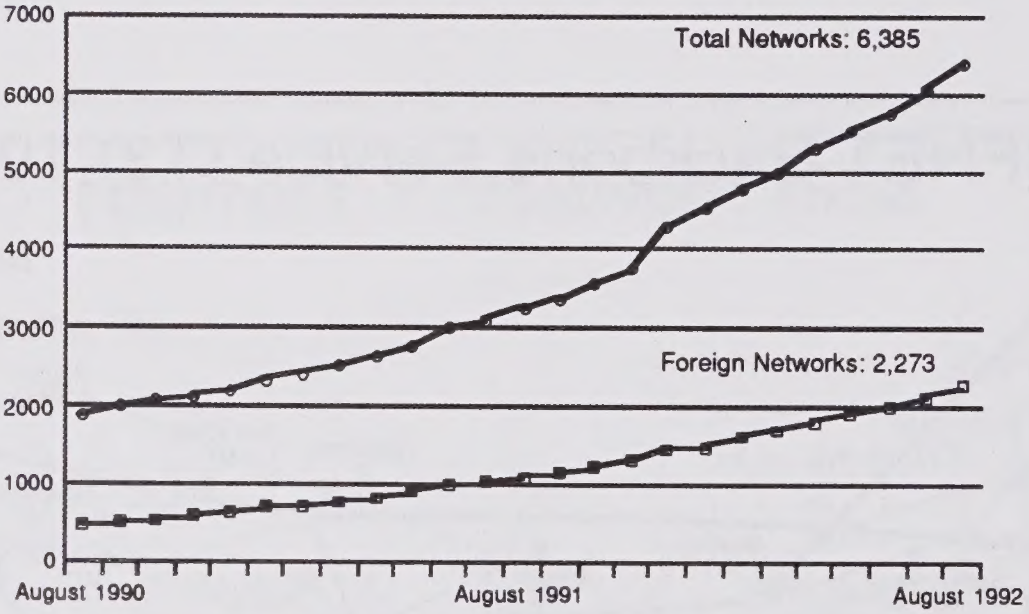
NSFNET Networks

Number of foreign, regional, state and local networks August1992



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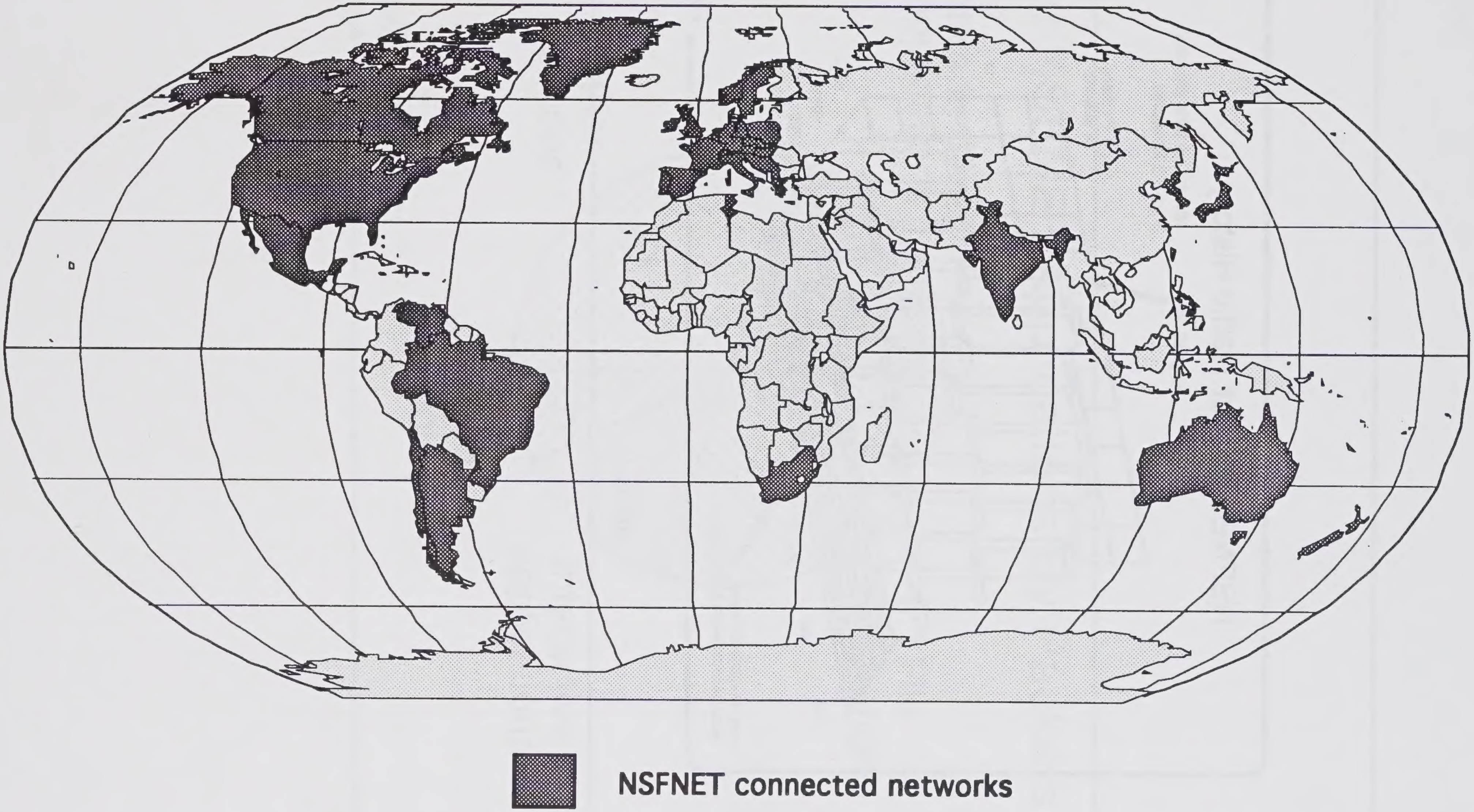
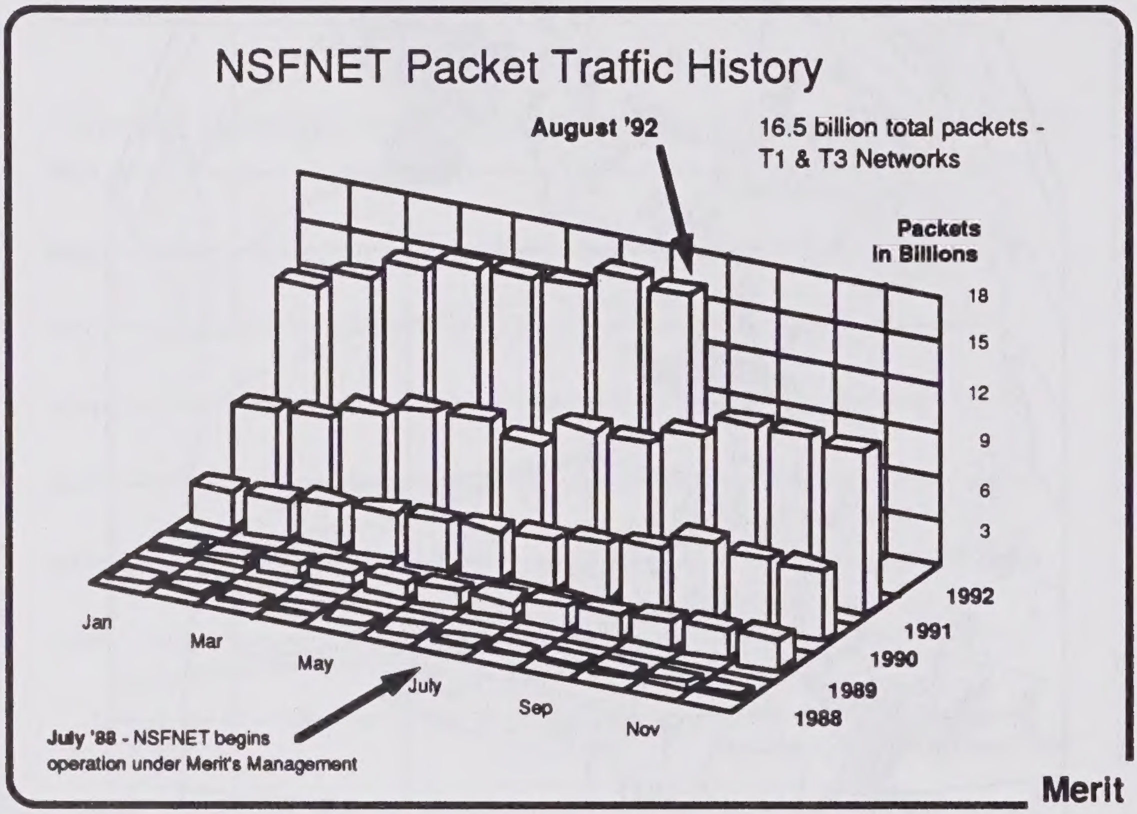
NSFNET Networks


▨ NSFNET connected networks



NSFNET Packet Traffic History

August '92

16.5 billion total packets -
T1 & T3 Networks

July '88 - NSFNET begins operation under Merit's Management

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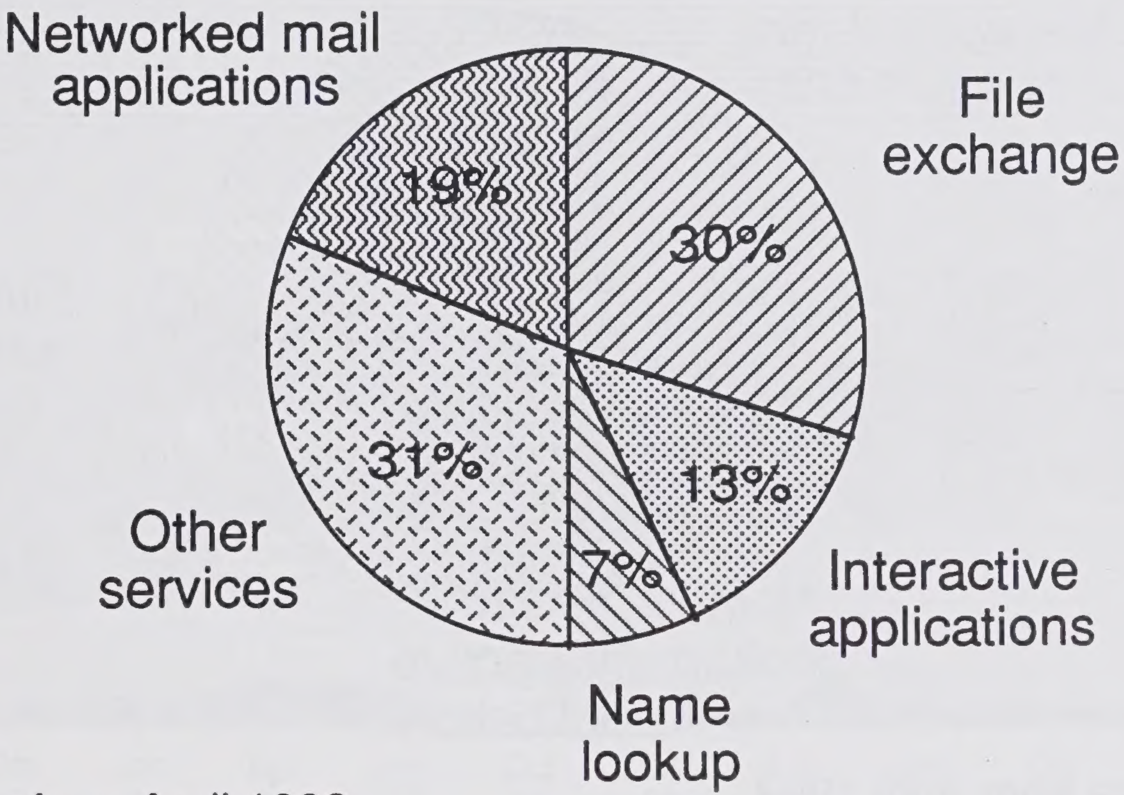
Major NSFNET Applications By Packets



Statistics from April 1992

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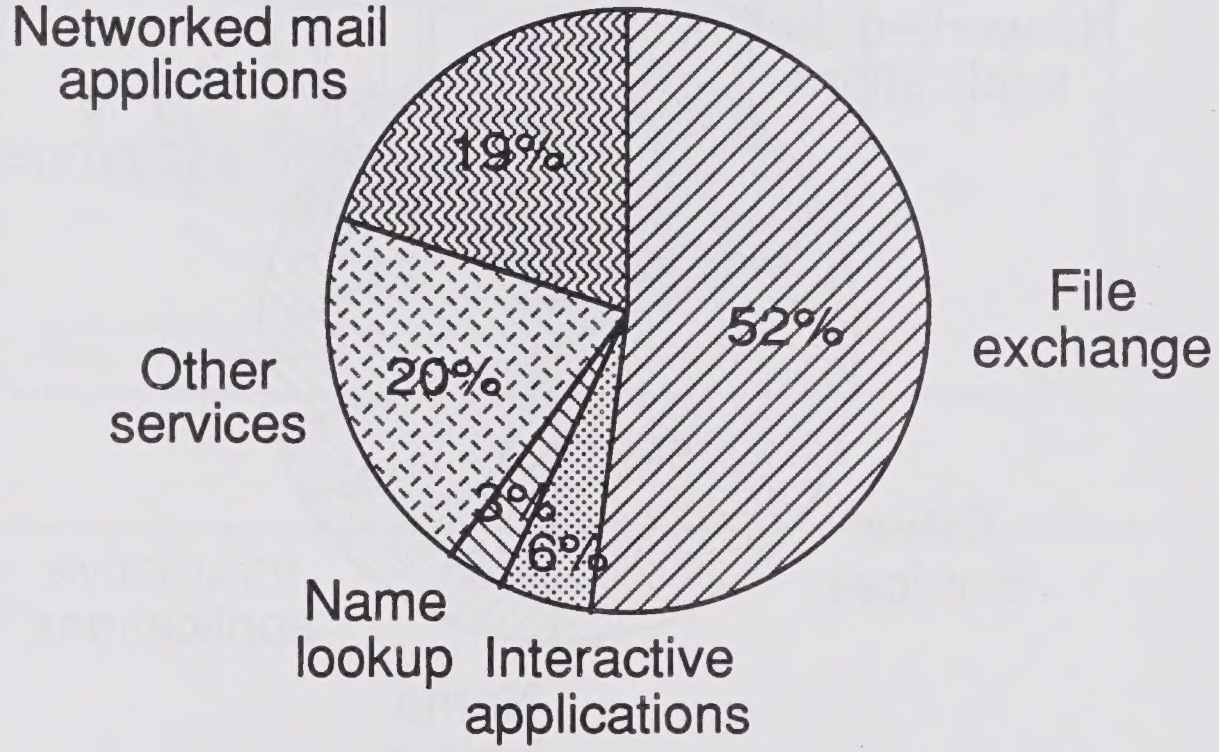
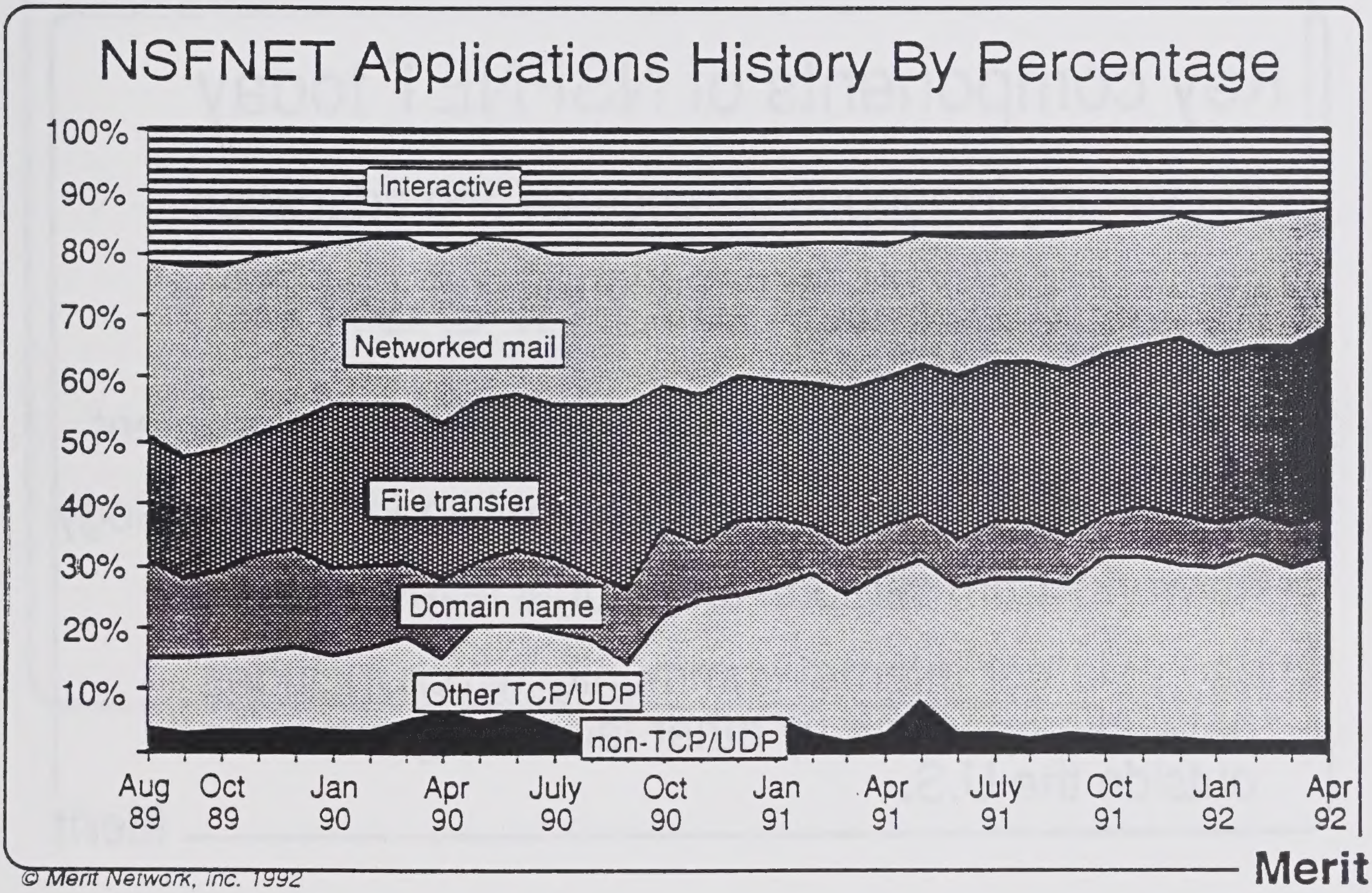
Major NSFNET Applications By Bytes



Statistics from April 1992


NSFNET Applications History By Percentage

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Key components of NSFNET today

- networking in support of research and education
- common protocols (information exchanged in a "common" language)
- cooperative effort of academia, industry, government
- promotes national leadership in networking technology
- networks from campus to national levels
- part of larger Internet community which includes networks operated by other federal agencies and outside the U.S.

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- Who's in charge?

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No one owns the Internet!

Just like there are lots of phone companies, there are also lots of network providers

Interoperation is a result of established standards and policy agreements

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Coordinating groups

- Standards (ISOC)
- Federal policy groups (FNC)
- Providers and user associations (FARNET, CIX)

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World-wide Internet Standards

- Internet Society (ISOC)
- Internet Activities Board (IAB)
- Internet Research Task Force (IRTF)
- Internet Engineering Steering Group (IESG)
- Internet Engineering Task Force (IETF)

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FARNET

- FARNET is a non-profit corporation whose members are primarily U.S. Internet providers (Federation of Academic and Research Networks)
- Current member organizations include metropolitan, state, mutlit-state, "community of interest," and backbone networks as well as telecommunication companies

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Commercial Internet Exchange (CIX)

- Trade association of commercial Internet service providers
- Membership includes provision for interconnecting and exchanging commercial traffic between members

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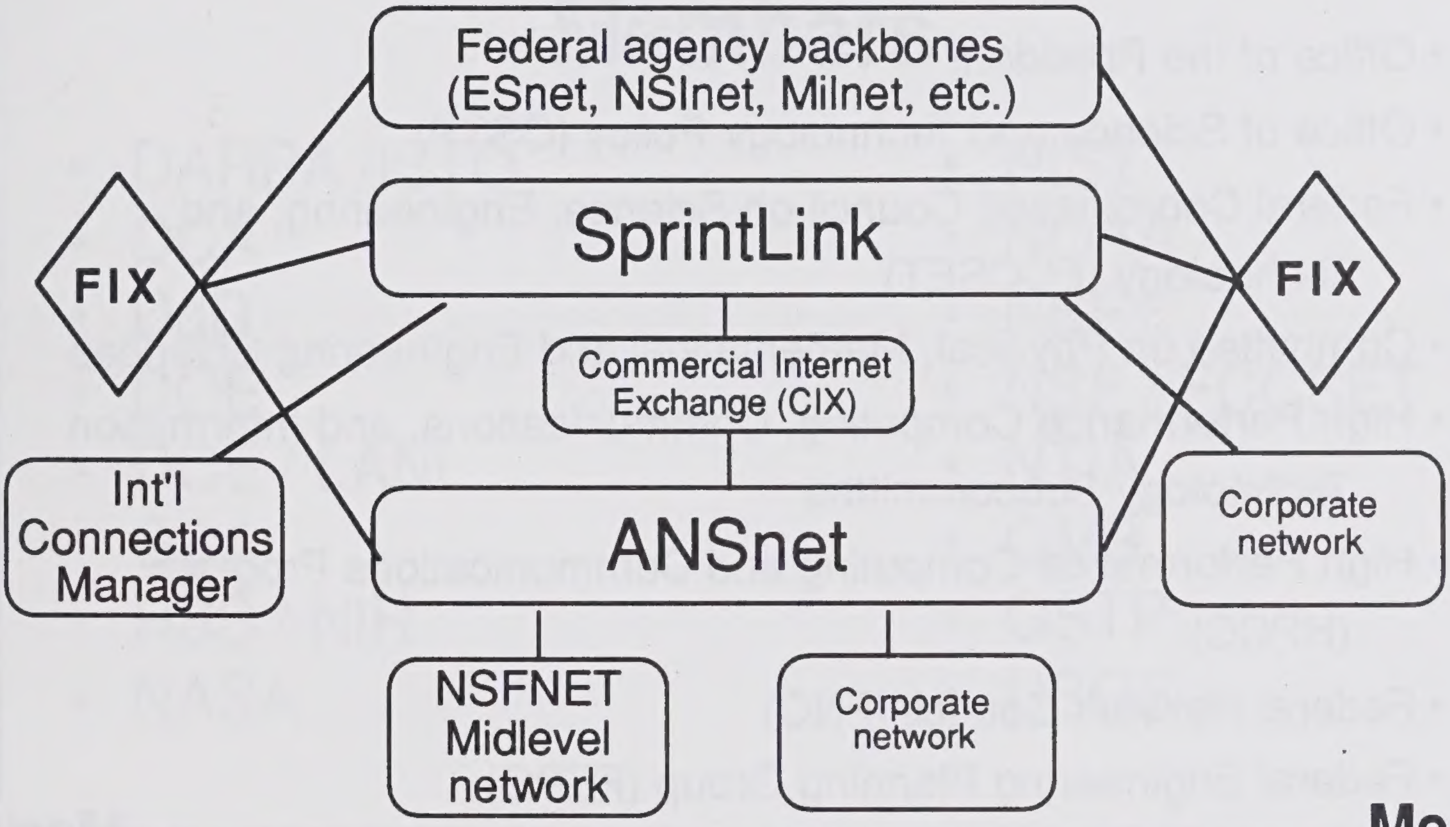
Interconnecting Networks



Federal agency backbones (ESnet, NSInet, Milnet, etc.)

FIX

SprintLink

FIX

Commercial Internet Exchange (CIX)

Int'l Connections Manager

ANSnet

Corporate network

NSFNET Midlevel network

Corporate network

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U.S. Federal Networking

- Office of the President
- Office of Science and Technology Policy (OSTP)
- Federal Coordinating Council on Science, Engineering, and Technology (FCCSET)
- Committee on Physical, Mathematical and Engineering Sciences
- High Performance Computing, Communications, and Information Technology Subcommittee
- High Performance Computing and Communications Program (HPCC)
- Federal Network Council (FNC)
- Federal Engineering Planning Group (FEPG)

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Federal Networking Council (FNC) Members

- DARPA /ISTO
- DCA
- DoD
- DOE
- DOE / LANL
- GSA
- HSS / NIH
- NASA
- NIST
- NOAA
- NSF
- NSF / FCCSET
- NTIA
- OMB
- OSTP
- USGS

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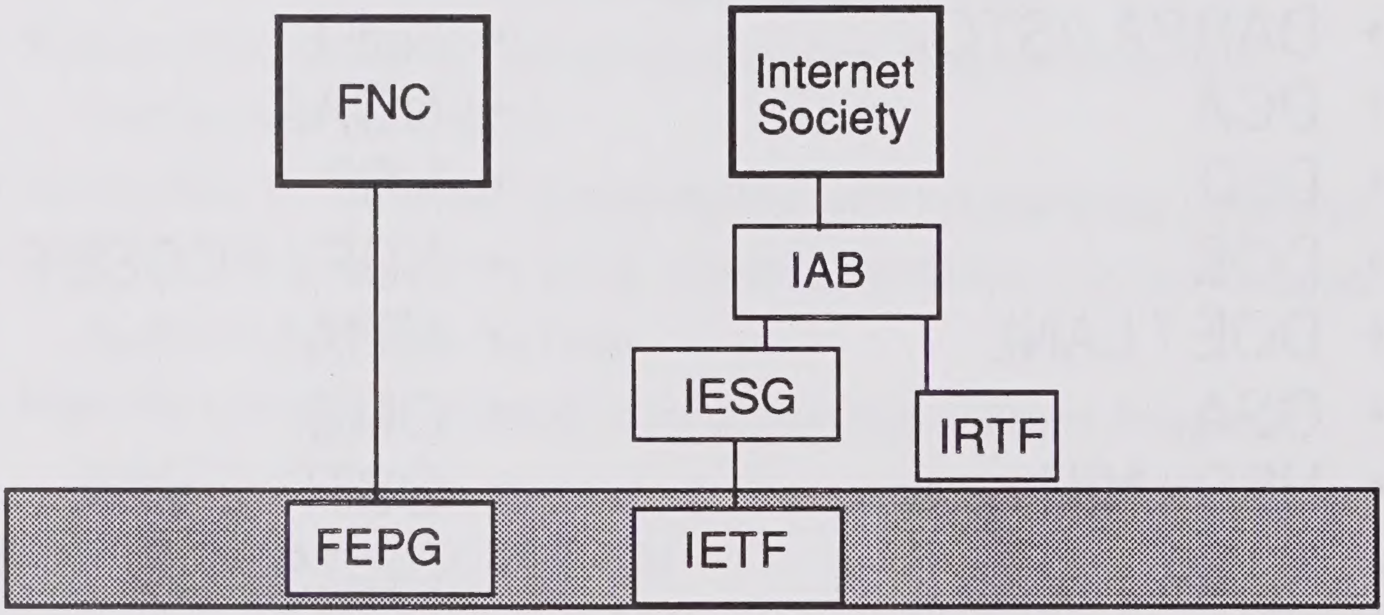
Interrelationships

Internet groups cooperate to assure Internet interoperability and world-wide connectivity



FNC

Internet Society

IAB

IESG

IRTF

FEPG

IETF

Groups directly concerned with engineering and operations

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- What are the issues for the future?

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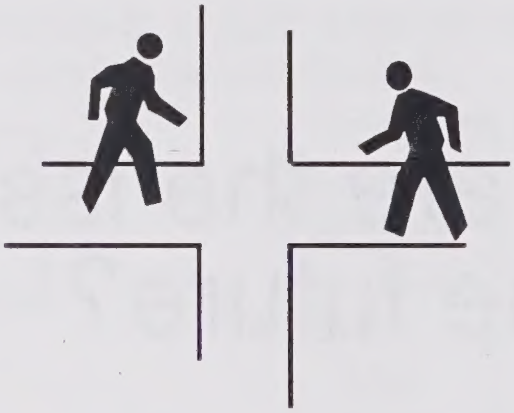
Crossroads



- Evolved from R & D - engineers designing and using networks
- Expanded by cooperation and volunteerism
- Now more user-oriented applications

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NSFNET Traffic Growth Trends

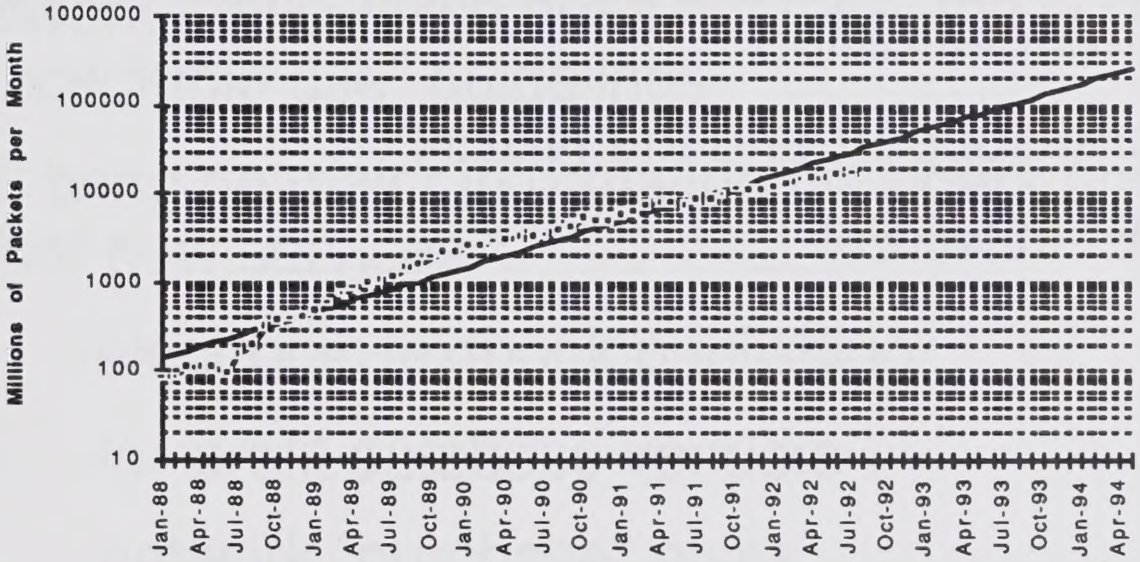

Figure 1

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Issues affecting the future

- Commercialization
- Federal support and the NREN
- the "E" in NREN

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Commercialization

- network traffic which does not meet the NSF "acceptable use" guidelines
- will bring on major information providers and other new services
    - -electronic textbook publishing
    - -for-profit database vendors
    - -network "purchase" plans
- encourages new services through open market

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Commercial Providers

- ANS (Advanced Network & Services
- PSI (Performance Systems Int'l)
- Alternet
- Sprint
- CIX (Commercial Internet Exchange)

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Federal networking programs

1987	Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) recommends NREN program
1991	Bush administration releases High Performance Computing and Communications plan for 1992 federal budget
1991	NREN legislation passes Congress

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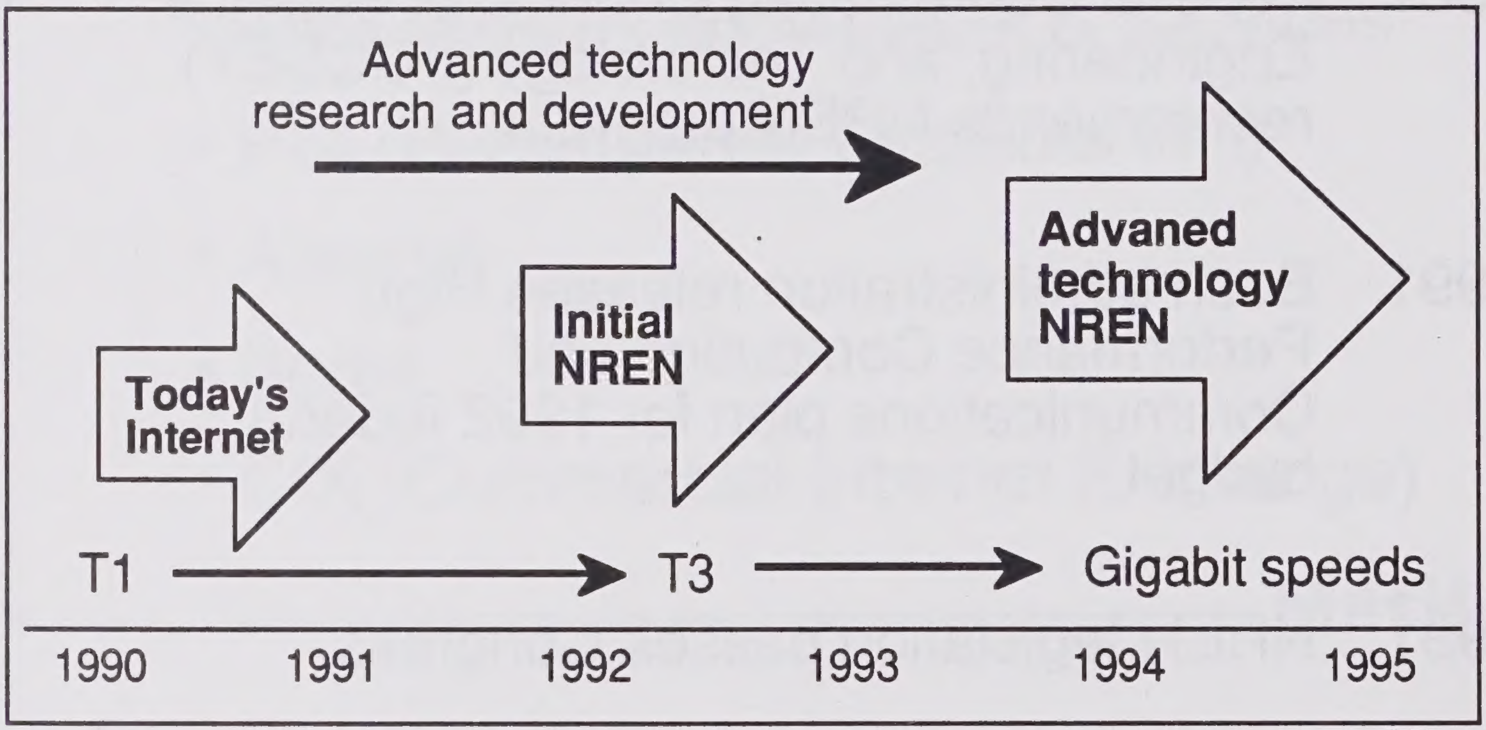
NREN
FCCSET Forecast 1987



Advanced technology
research and development

Today's Internet

Initial NREN

Advaned technology NREN

T1 → T3 → Gigabit speeds

1990 1991 1992 1993 1994 1995

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National Research and Education Network (NREN)

- High speed networking linking government, industry, education and research
- Research and development
- Education
- Technology transfer
- Prototype advanced communications
- Support applications for "grand challenges" of science

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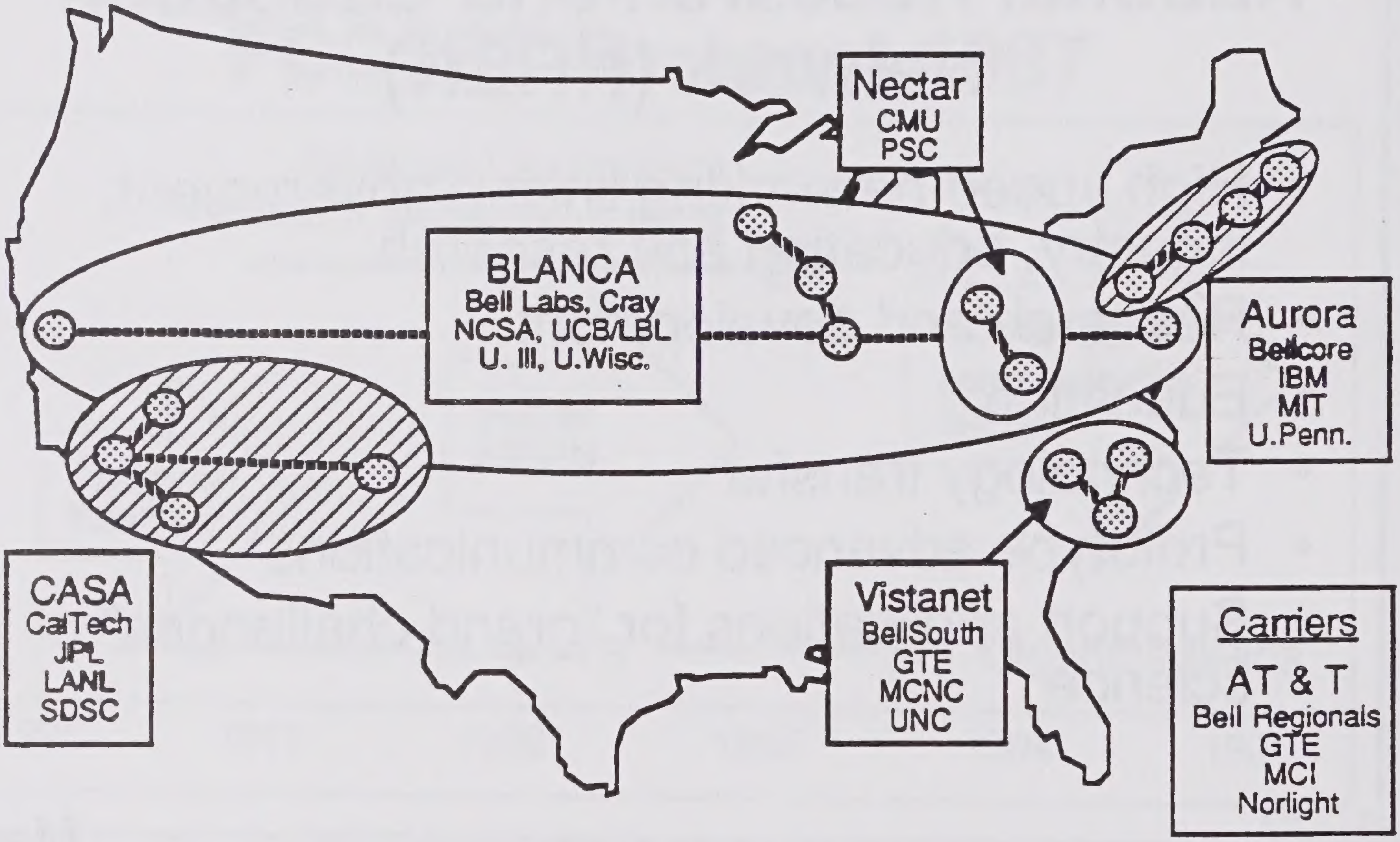
Planned Gigabit Testbeds



Nectar
CMU
PSC

BLANCA
Bell Labs, Cray
NCSA, UCB/LBL
U. Ill, U.Wisc.

Aurora
Bellcore
IBM
MIT
U.Penn.

CASA
CalTech
JPL
LANL
SDSC

Vistanet
BellSouth
GTE
MCNC
UNC

Carriers
AT & T
Bell Regionals
GTE
MCI
Norlight

NSFNET future

NSFNET program plan will include new network providers, higher speed networks, increased interconnectivity, and plans for improving the "information infrastructure"

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The "E" in NREN—National Education and Research Network

Major initiatives to bring in higher education institutions which do not have a major research component (small liberal art colleges, junior and community colleges)

Interest in K-12 connectivity and applications

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Organizations concerned with the future of national networking

- Electronic Frontier Foundation (EFF) —founded by Mitch Kapor to promote national networking as well as study legal and legislative issues

- Computer Systems Policy Project (CSPP)—CEOs of major computer industry corporations recommending social policy goals for NREN and HPCC

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Internet Trends

- New Applications
- More connectivity to broader community
- Decreasing costs for connectivity
- More "user-friendly" technologies
- Rapidly changing marketplace

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Networking challenges for the campus

- keeping up with rapidly changing technologies
- integrating diverse technologies
- providing access to entire population
- developing and using resources on the network

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THE MERIT NETWORKING SEMINARS

Navigating the Internet

An Information Services Cruise

Laura Kelleher
Coordinator, Network Applications
Merit Network, Inc.

BIOGRAPHICAL NOTES

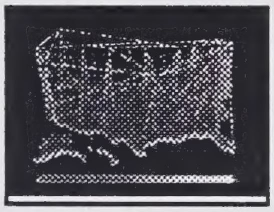
Laura Kelleher
Coordinator, Network Applications
Merit Network, Inc.

Laura Kelleher is Coordinator of Network Applications for Merit Network. Ms. Kelleher has been with Merit since the beginning of the NSFNET project. As former editor of the *Link Letter*, she assisted in establishing many Merit Information Services publications and projects. Prior to her work at Merit, she was the Senior Instructor for the University of Michigan Residence Halls Computer Program. She has a B.A. in English from the University of Michigan. As Merit's representative to the Coalition of Networked Information, she has actively participated in the working group on Directories and Resource Information Services.

Merit provides:

MichNet-

The longest running regional network in the country

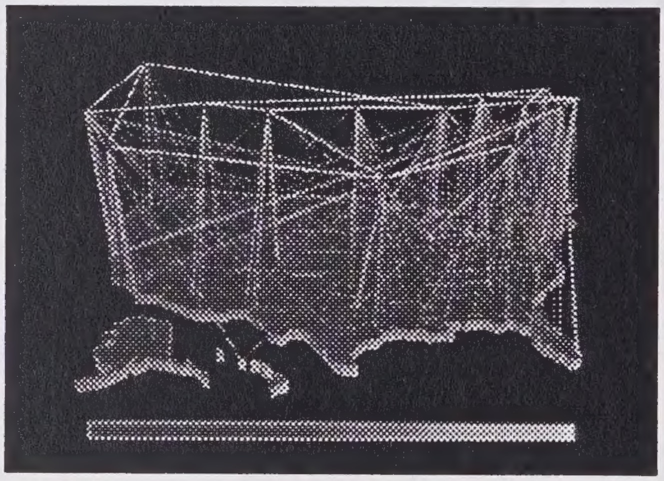


NSFNET-

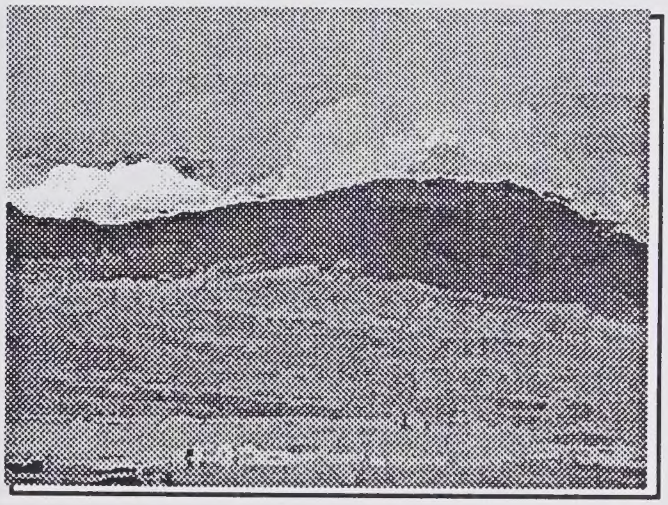
The National Science Foundation Network

Network Engineering
Information Services
Consulting

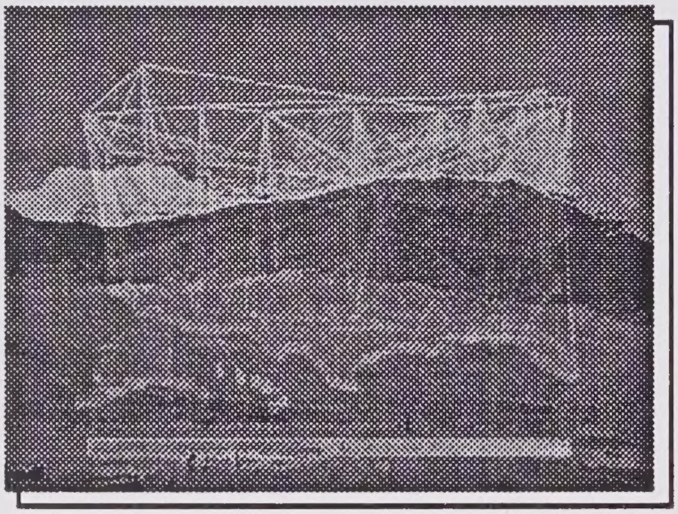
The Internet is a "network of networks"



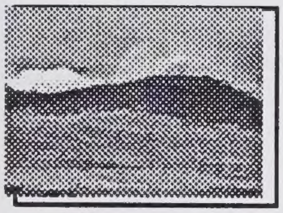
The Internet is like an ocean



The Internet is like an ocean

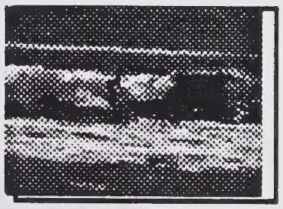


The Internet is like an ocean...



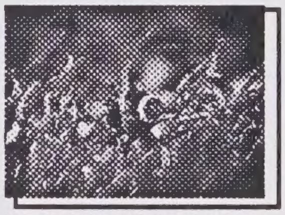
it is a great resource

it is huge

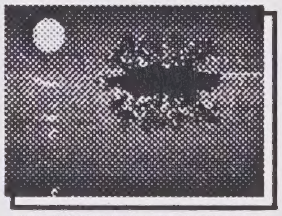


no one owns it

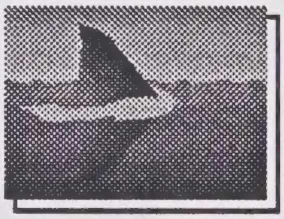
The Internet is like an ocean...



it is loaded with resources

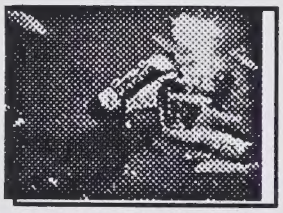


wonderful islands



and occasional perils

Using the Internet is like swimming in the ocean...

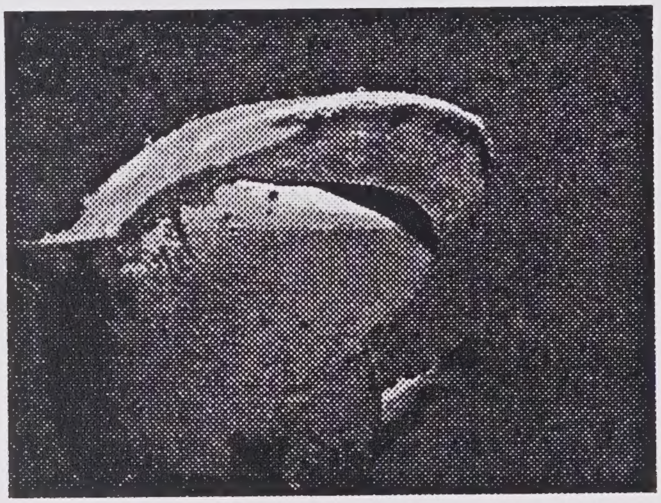


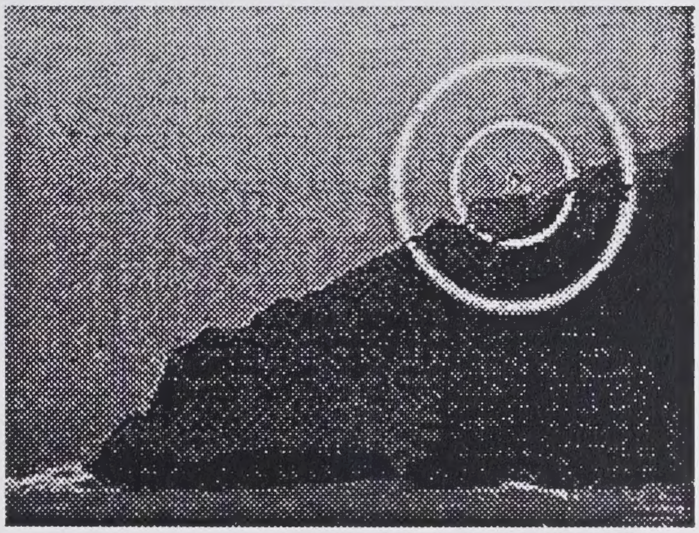
you could drift aimlessly...

become stranded...

or...

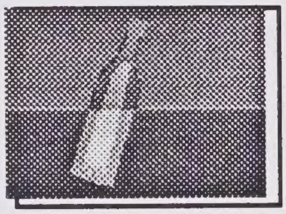
...get eaten by sharks!



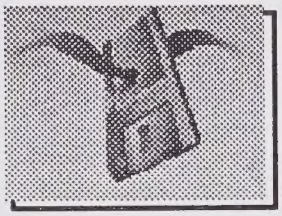


Fortunately, you can use navigation tools to rescue yourself.

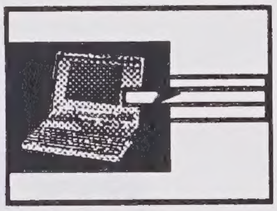
The Basic Internet Navigation Tools:



E-mail



File Transfer Protocol (FTP)



Telnet

Specialized Information Delivery Tools

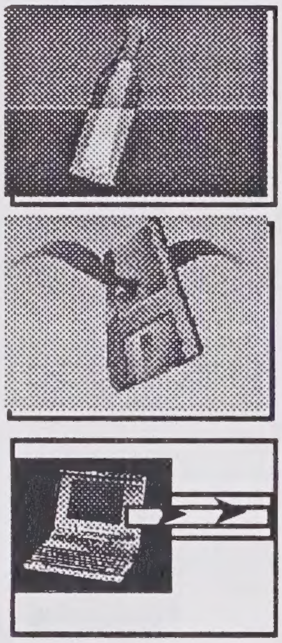
GOPHER
Archie
WAIS

Gopher

archie

WAIS

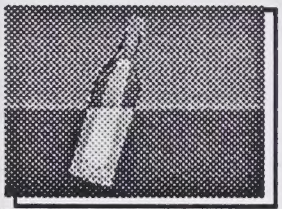
Internet Navigation Tools



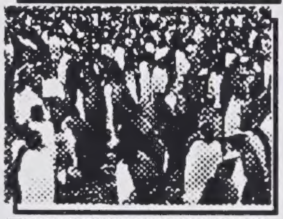
Master these networking tools and you will be able to access thousands of resources

- Electronic mail
- File Transfer Protocol (FTP)
- Telnet

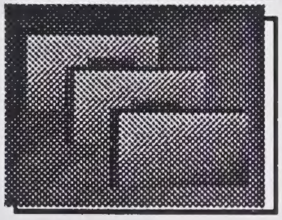
Electronic Mail



Send electronic mail to your colleagues around the world



Join an e-mail discussion list of interest to you



Request files through e-mail

Sending Electronic Mail

- Finding e-mail addresses is a hit and miss procedure at best
- No national directory of electronic mail addresses

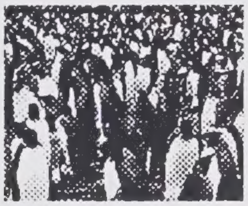
- Several prototype directory projects underway
- Best way to find e-mail address: *Ask the person!*

Electronic-mail Discussion Lists

Excellent method for discussing issues with large and distributed audience

Discussion lists on hundreds of topics:

- Academic and research (biology, humanities)
- Computers, libraries, education
- Fields of interest (Anglo Saxon literature, dogs)



CAUTION: You may get lots of mail!

For more information, **join new-list@vm1.nodak.edu**

Electronic-mail Discussion Lists—Sports Psychology

SPORTPSY—Exercise and sports psychology

To subscribe send an electronic message to:
listserv@templevm.bitnet
Subject: [BLANK]
Text: **subscribe sportpsy your real name**
unsubscribe sportpsy your real name

To post to the list, send to:
sportpsy@templevm.bitnet

For more info, send e-mail to **V5289E@templvm.bitnet**

Electronic-mail Discussion Lists—KIDSNET

KIDSNET — K-12 Kids & Teachers

To subscribe send an electronic message to:
KIDSNET-request@vms.cis.pitt.edu
Subject: [BLANK]
Text: **subscribe kidsnet your real name**
unsubscribe kidsnet your real name

To post to the list send to:
kidsnet@vms.cis.pitt.edu

The list owner is: **carlitx@vms.cis.pitt.edu**

Electronic-mail Discussion Lists—PACS-L

PACS-L—Public Access Computer System Forum

To subscribe send an electronic message to:
listserv@UHUPVM1.Bitnet
Subject: (BLANK)
Text: **Subscribe PACS-L your real name**
unsubscribe PACS-L your real name

To post to the list send to:
PACS-L@UHUPVM1.Bitnet

The list owner is: **libpacs@uhupvm1.bitnet**

Finding Electronic-mail Discussion Lists

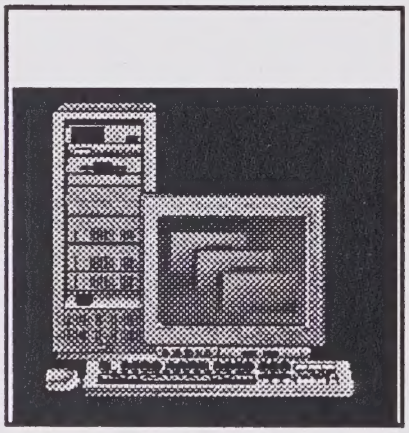
ftp dartcms1.dartmouth.edu

Dartmouth maintains a file of e-mail discussion lists

- Available as a Hypercard stack or as a tab text file to place into any spreadsheet
  cd siglists
  get listlist.hqx

Questions: **david@dartcms1 or David.Avery@dartmouth.edu**

Requesting Files Through E-mail

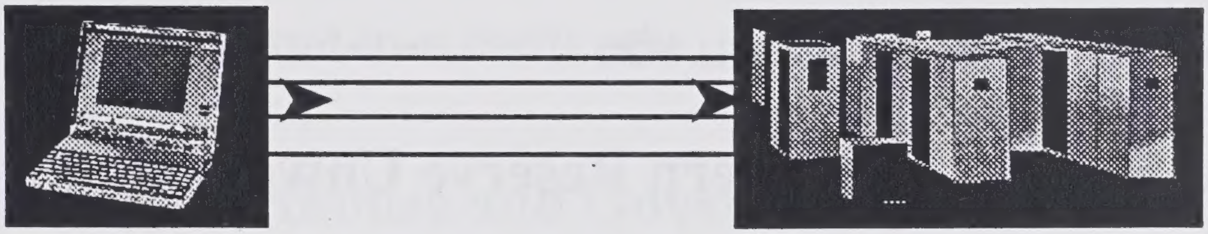


Many databases can be accessed using remote mail query

Server command must be first text line (not the subject) of the mail message

send
To: **nis-info@nic.merit.edu**
Subject: [BLANK]
Text: **help**

Telnet



Telnet allows the user to establish an interactive session with another computer.

telnet hermes.merit.edu
Which Host? **help**

To open a connection with a remote host, you must know its Internet name or address.

Cleveland Free-Net

telnet freenet-in-a.cwru.edu

Based at Case Western Reserve University

- Offers electronic mail
- Public Square, Medical Arts Building
- USA Today Headline News

For more info, send e-mail to **aa001@cleveland.freenet.edu**

Cleveland Free-Net

telnet freenet-in-a.cwru.edu

The Courthouse and Government Center

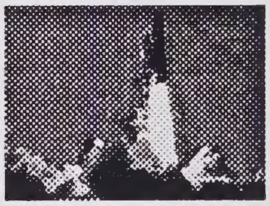
- U.S. Supreme Court's Project Hermes
- Legal Clinic (questions and answers)
- What's New in the Law
- “You be the judge”
- Freedom Shrine (documents)

For more info, send e-mail to **aa001@cleveland.freenet.edu**

Spacelink

telnet spacelink.msfc.nasa.gov

- **Sponsored by NASA Marshall Space Flight Center**
- **Primary focus K-12 educators and students**
- Information about shuttle launches
- Astronauts' biographies
- NASA publications



For help, call a system administrator at (205) 544-6531

U of M Weather Underground

telnet madlab.sprl.umich.edu 3000

Data from the Department of Atmospheric, Oceanic and Space Sciences

- Forecasts for major US and Canadian cities
- Ski conditions
- Earthquake reports

Comments, send e-mail to **sdm@madlab.sprl.umich.edu**

© 1992 Merit Network, Inc.

Geographic Name Server

telnet martini.eecs.umich.edu 3000

Data from the U.S. Geodetic Survey and the U.S. Postal Service

- All U.S. cities, counties, and states, some U.S. mountains, rivers, lakes, national parks
- Zip code, telephone area code, time zone
- Elevation and latitude/longitude
- Population

Send questions to **libert@eecs.umich.edu**

MicroMuse—Electronic Village

telnet chezmoto.ai.mit.edu 4201

Multi-user virtual reality in an informal setting

- Vision of the 24th century, a blend of high technology and social consciousness
- Education, the environment, and communication
- Science Center of interactive exhibits (puzzles, theater of electricity, children's museum)
- Pilot a starship and tour the planets and stars

To register: **micromuse-registration@chezmoto.ai.mit.edu**

Campus-Wide Information Systems

University of North Carolina, Chapel Hill

telnet info.acs.unc.edu

Username: info

Provides information about UNC-Chapel Hill

- Faculty staff directories
- Job opportunities
- Publications: Link Letter, Postmodern Culture, Arts & Humanities News

For more info, send e-mail to **hallman@unc.bitnet**

Campus-Wide Information Systems

Massachusetts Institute of Technology

telnet techinfo.mit.edu

Provides information about the MIT campus, the city of Boston, and using the Internet

- List of Internet-accessible library card catalogs
- Internet Resource Guide

For more info, send e-mail to **tjm@eagle.mit.edu**

Colorado Alliance of Research Libraries

telnet pac.carl.org

Internet accessible card catalog

- Database of journals searchable by subject
- List of other libraries on the Internet
- Information about Colorado

Warning! Write down the disconnect information

For more info, send e-mail to **help@carl.org**

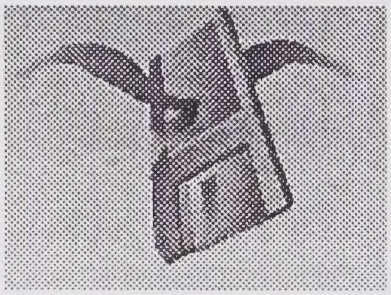
Dartmouth College Library

telnet lib.dartmouth.edu

- Internet accessible card catalog
- Shakespeare plays and sonnets
- King James version of the Bible
- Indexes to journals (DARTMED, MLA Biblio.)

Questions send e-mail to: **PUBLIC-admin@dartmouth.edu**

File Transfer Protocol (FTP)



Allows the transfer of files between computers on the Internet

ftp nic.merit.edu
User: **anonymous**
Password: **guest**
dir (to see directory)
cd (to change directory)
get read.me

Project Gutenberg

```
ftp mrcnext.cso.uiuc.edu
```

Encourages the creation and distribution of English language electronic texts

Goal: To provide 10,000 books by 2001 and to reduce costs to users

Alice in Wonderland, Through the Looking Glass, Book of Mormon, The Bible, Roget's Thesaurus

```
ftp mrcnext.cso.uiuc.edu
cd etext
get filename.filetype
```

For more info, send e-mail to **gutnberg@vmd.cso.uiuc.edu**

Handicap News Archives

ftp handicap.shel.isc-br.com

Provides online information regarding disabilities

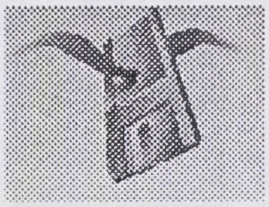
Americans with Disabilities Act, American Council for the Blind, amputee information, calendar of conferences, caregiver information, chronic fatigue syndrome, educational software, cerebral palsy

ftp handicap.shel.isc-br.com
cd pub
For more info, send e-mail to **wtm@bunker.shel.isc-br.com**

FTP Public Domain Software Sites

Merit/University of Michigan software archives—public domain Mac, IBM PC, Apple II, NeXT software
ftp archive.umich.edu
for archive info: **archive-request@archive.umich.edu**

Info-Mac—Mac public domain archive at Stanford
ftp sumex-aim.stanford.edu
cd info-mac
for help: **info-mac-request@sumex.aim.stanford.edu**



Decompressing Public Domain Software

Extension	Computer	Software	Transfer
fn.ZIP	MS-DOS	PKUNZIP.EXE	binary
fn.ARC	MS-DOS	ARCE.COM	binary
fn.HQX	Macintosh	BinHex	ASCII
fn.SIT	Macintosh	Stuffit/Unstuffit	binary
fn.TAR	Unix/DOS	PDTAR.ARC	binary
	Macintosh	tar	
fn.CPT	Macintosh	Compact Pro	binary
fn.Z	Unix/DOS	Compress.ARC	binary
	Macintosh	MacCompress	

Fetch (Mac FTP client)

dartvax.dartmouth.edu

Graphical user interface to FTP

Mac TCP-based

- Uses icons for files and folders
- Automatically determines binary or text file type
- Automatically decompresses file
- When file transfer is finished you have working software! (instead of *.sit.hqx)

Questions send e-mail to: **Jim.Matthews@dartmouth.edu**

Finding Internet-connected Libraries

Internet-accessible library catalogs and databases

```
ftp ariel.unm.edu
cd library
get library.ps (postscript)
get internet.library (ASCII)
```

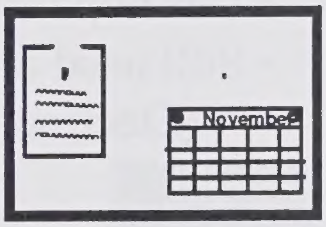
Library Catalogs on the Internet: Strategies for Selection and Use (American Library Association)

```
ftp dla.ucop.edu
cd pub/internet
get libcat-guide
```

Finding Internet-connected BBSs

List of Internet-accessible Bulletin Board Systems

ftp wuarchive.wustl.edu
cd pub



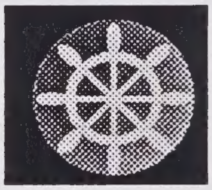
Send an electronic mail request to:
zamfield@dune.ee.msstate.edu

For info, send e-mail to: **zamfield@dune.ee.msstate.edu**

Navigating with an Automatic Pilot

The Internet is becoming easier to navigate

- Better client software—no longer only line-based
- Development of client-server applications
- Still need to use networking navigation tools (Electronic mail, Telnet, and FTP)



Client-Server Applications

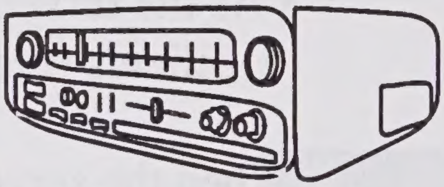
- Server program contains centralized data
- Client programs make requests of the server
- As the server data is updated, clients receive new data

When the server is down, user cannot get information

Internet Relay Chat - IRC

Internet Relay Chat (IRC)

- Like a CB radio
- Real-time conversations
- Open a connection and provide a subject for discussion
- UNIX, Macintosh, and DOS clients



unmoderated, uncensored

For more info about IRC, contact your local network administrator

Be Your Own Network Navigator

Read the following usenet news lists:

Listing of Internet-accessible bulletin boards:
alt.bbs.internet
Finding public domain software:
comp.archives
Wide-Area Information Servers:
alt.wais

For more info about usenet news, contact your local network administrator

Be Your Own Network Navigator

Subscribe to the following e-mail discussion lists:

Updates to e-mail discussion lists
    new-list@ndsuvm1.bitnet
Campus-Wide Information Servers
    CWIS-L@WUVMD.bitnet
New Internet-accessible libraries
    lib_hytelnet@sask.usask.ca
Internet-accessible libraries
    PACS-L@uhupvm1.bitnet

Be Your Own Network Navigator

Introducing the Internet Directory

Internet Access Guide, Internet Bibliography, Internet Resource Guide, Link Letter, and Internet For Your Information (FYI) series

ftp nic.merit.edu
cd introducing.the.internet

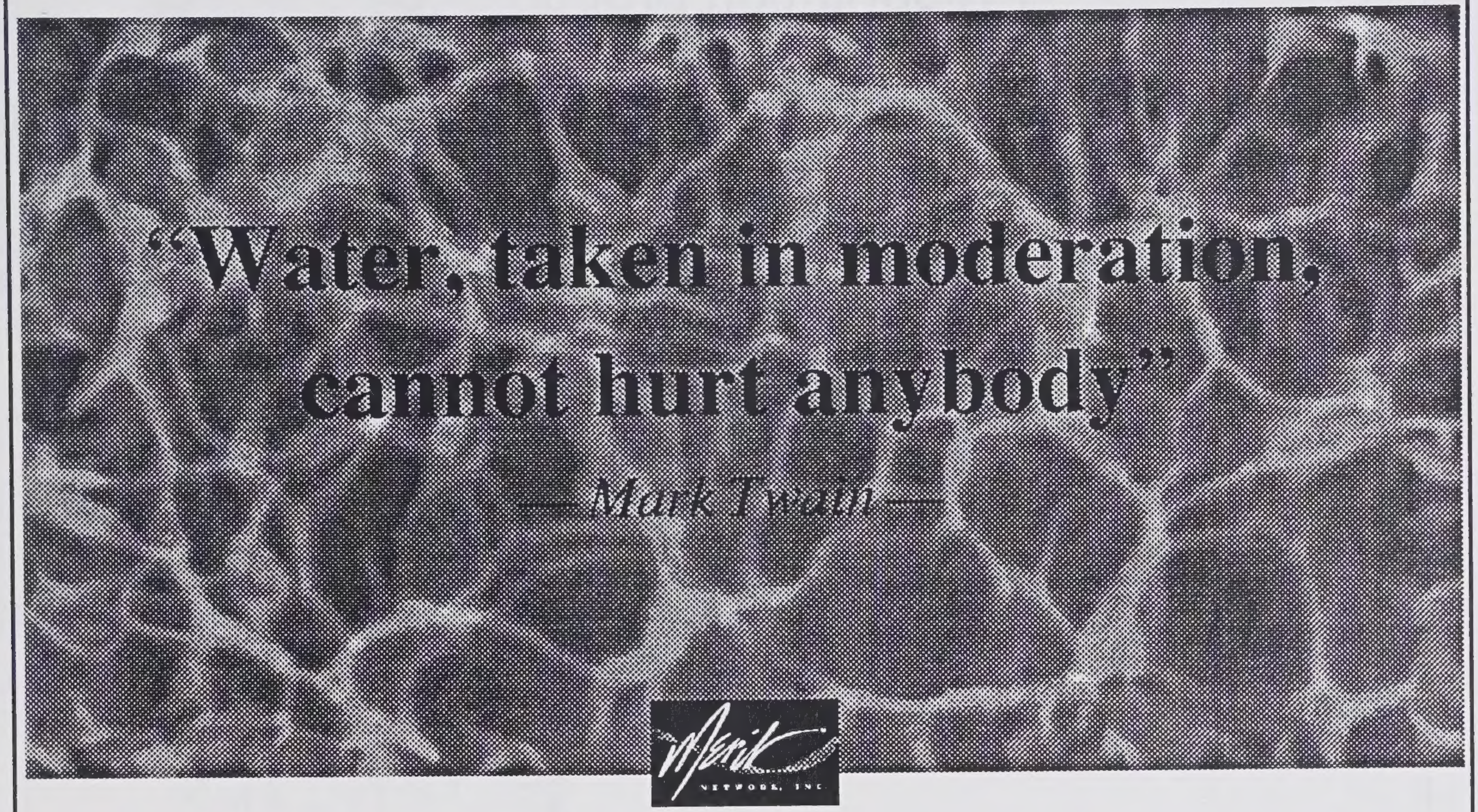
For more information send e-mail to: **nsfnet-info@merit.edu**

Be Your Own Network Navigator

Merit's "Cruise of the Internet"

- Interactive instructional guide to the Internet
- Runs on a color Macintosh (PC version in development)
- Discusses navigational tools e-mail, FTP and Telnet
- How to access Internet resources

```
ftp nic.merit.edu
cd nsfnet /resources
get merit.cruise.sea.hqx
get merit.cruise.readme.txt
```



“Water, taken in moderation, cannot hurt anybody”

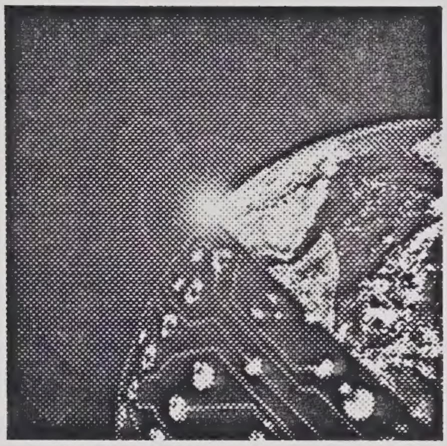
— *Mark Twain* —

Merik
NETWORK, INC

Presentation produced by
Merit Network, Inc.
Information Services

Written by Laura Kelleher and Mark Davis-Craig
Art direction by Steve Burdick

THE MERIT NETWORKING SEMINARS



Navigating the Internet

Network Tools for Document Delivery

Mark Davis-Craig
Coordinator, Information Sources
Merit Network, Inc.

BIOGRAPHICAL NOTES

Mark Davis-Craig
Coordinator, Information Sources
Merit Network, Inc.

Mark Davis-Craig coordinates the Merit Networking Seminars. He received a B.A. in French from the University of Michigan in 1988. He has been working at Merit since March of 1989. Before joining the NSFNET project, Mr. Davis-Craig worked on Merit's MichNet activities providing software support and technical assistance to newly-connected institutions. He is the moderator of Merit's network-resource-information-sharing mailing list, nris@merit.edu.

Information Delivery on the Internet

Mark Davis-Craig, Merit Network. Inc.

Gopher, X.500, WAIS, archie, World Wide Web

The Basic Internet Toolkit contains:

- ftp
- mail query
- telnet

A little bit better:

- use one of the tools—telnet—to get to a machine that has a more friendly user interface.

Information Delivery on the Internet

Better yet:

- client/server applications

Client/server applications

Why? It's more efficient:

- uses the workstation on your desktop
- less time spent as an "Internet scavenger"
- ties up less bandwidth and network resources

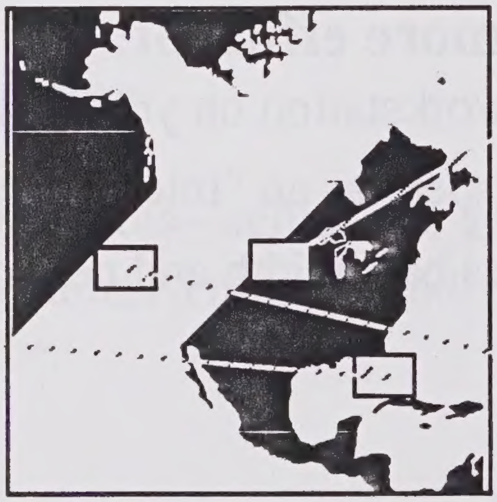
Client/Server - Automatic Teller Machines

- Automatic Teller Machines help explain the client/server concept

---

Client/Server - Automatic Teller Machines

It's the results that count!



ATM 3
(Maine)

Withdrawal from Bank of Omaha

ATM 1
(California)

Deposit to Florida State Bank

ATM 2
(Michigan)

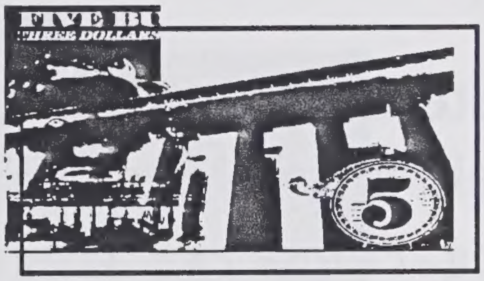
Balance Inquiry to Oregon State Bank

Client/Server - Automatic Teller Machines

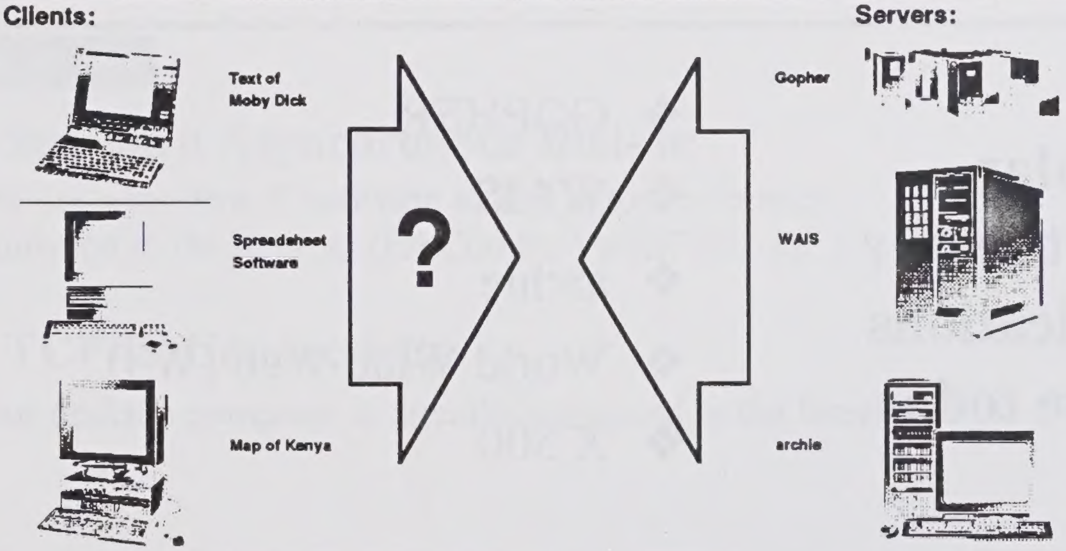
ATMs deliver

- money
- account information

regardless of bank location



Client/Server - It's the results that count!



Clients:

Text of Moby Dick

Spreadsheet Software

Map of Kenya

Servers:

Gopher

WAIS

archie

Client/Server - Internet Resources

Internet client/servers deliver information - regardless of location

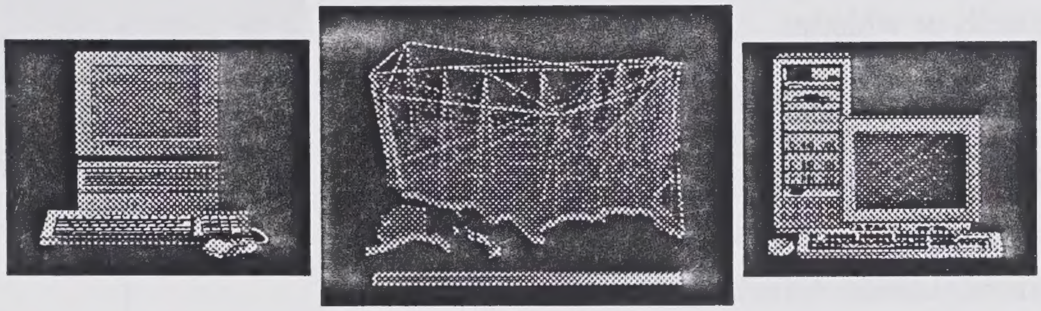
---

Client/Server - Internet Resources

Popular client/server applications in use today

- ❖ GOPHER
- ❖ WAIS
- ❖ archie
- ❖ World Wide Web (W3)
- ❖ X.500

Networking on Macintosh and DOS Computers



Networking on Macintosh and DOS Computers

Two Options:

1. Standard Asynchronous Dial-in:

You use a modem & software to dial in to a computer connected to the Internet (ProComm, VersaTerm, etc.).

2. TCP/IP Connectivity

Your desktop computer is directly connected to the Internet.

Standard Asynchronous Dial-in

- Load software on expensive computer to turn it into a 'dumb' terminal
- No bells or whistles
- line mode

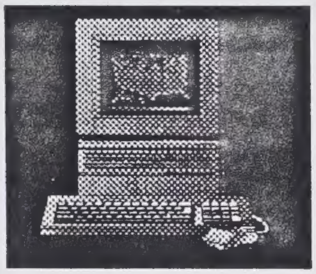
What you need:

- Computer
- Communication software
- Modem
- Phone number to dial

TCP/IP Connectivity

- Takes advantage of the full capabilities of your desktop computer
- Includes bells and whistles
- Graphical user interface

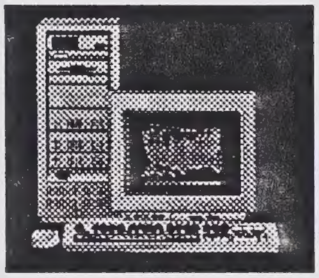
TCP/IP Networking on the Macintosh



Mac TCP is essential
Requiring either:

1. Ethernet card in Mac attached to Ethernet
2. Appletalk Mac with
   Ethernet connectivity through
   Fastpath or the equivalent
3. Dial-in access with new protocols

TCP/IP Networking on a DOS Computer



Many networked applications for MS-DOS require a packet driver with your Ethernet card

- Dial-in access with new protocols
- If your Ethernet card did not include
  a packet driver:

ftp sun.soe.clarkson.edu

Information Delivery on the Internet

GOPHER

developed at the University of Minnesota
as a Campus Wide Information System

GOPHER - Advantages

- easy to set up
- new text files become avaiable to "Gopher world" as soon as placed on local server

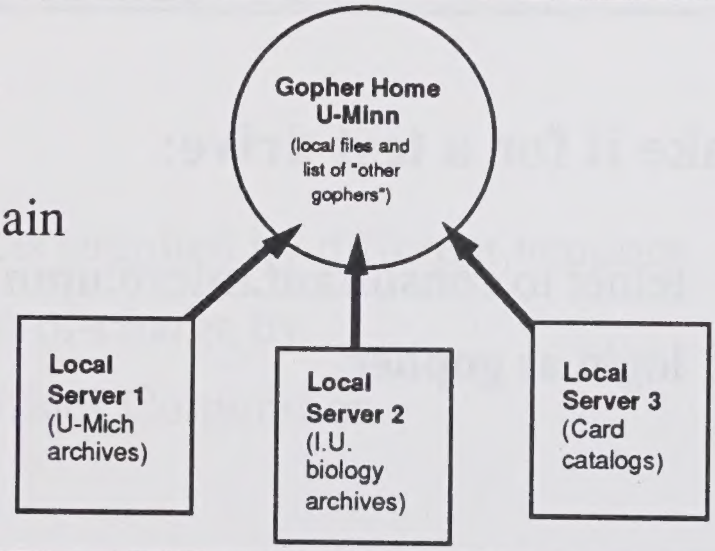
GOPHER - Advantages

Available for several platforms:

- Mac
- DOS
- X Window
- NeXT

GOPHER

Each local server announces its presence to the main server at U-Minn



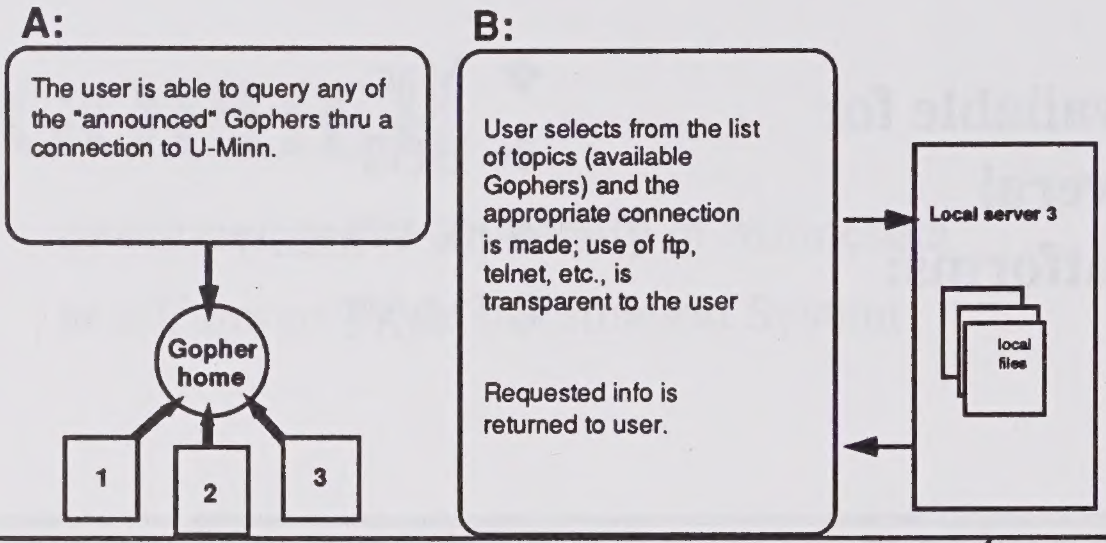
Gopher Home U-Minn
(local files and list of "other gophers")

Local Server 1
(U-Mich archives)

Local Server 2
(I.U. biology archives)

Local Server 3
(Card catalogs)

GOPHER



A:

The user is able to query any of the "announced" Gophers thru a connection to U-Minn.

B:

User selects from the list of topics (available Gophers) and the appropriate connection is made; use of ftp, telnet, etc., is transparent to the user

Requested info is returned to user.

GOPHER

Take it for a test drive:

- telnet to **consultant.micro.umn.edu**
- login as **gopher**

Obtaining Gopher client and server software:

- ftp to **boombox.micro.umn.edu**

WAIS

a set of products supplied by different vendors
distributed free-of-charge by
Thinking Machines Corporation

WAIS - Advantages

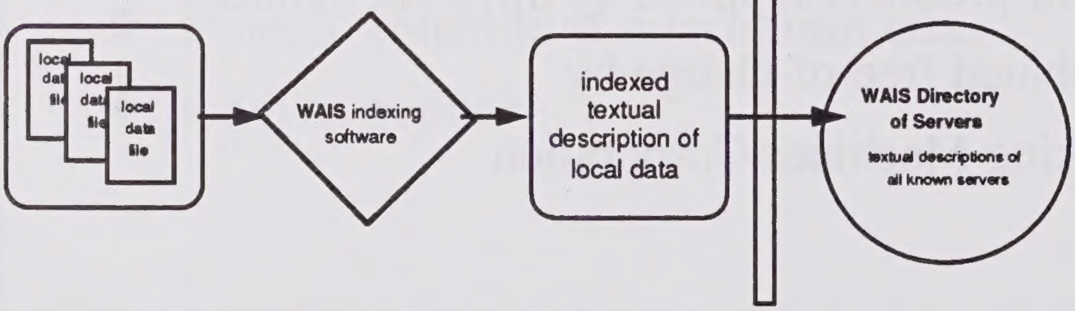
- suited for searching global information sources
- allows simultaneous easy access from the desktop to any number of distributed servers
- sources discovered are ranked according to the number of keywords matched

---

WAIS

Local site sets up WAIS server

A description
of the local data
is conveyed to the
Directory of Servers



local data file

local data file

local data file

WAIS indexing software

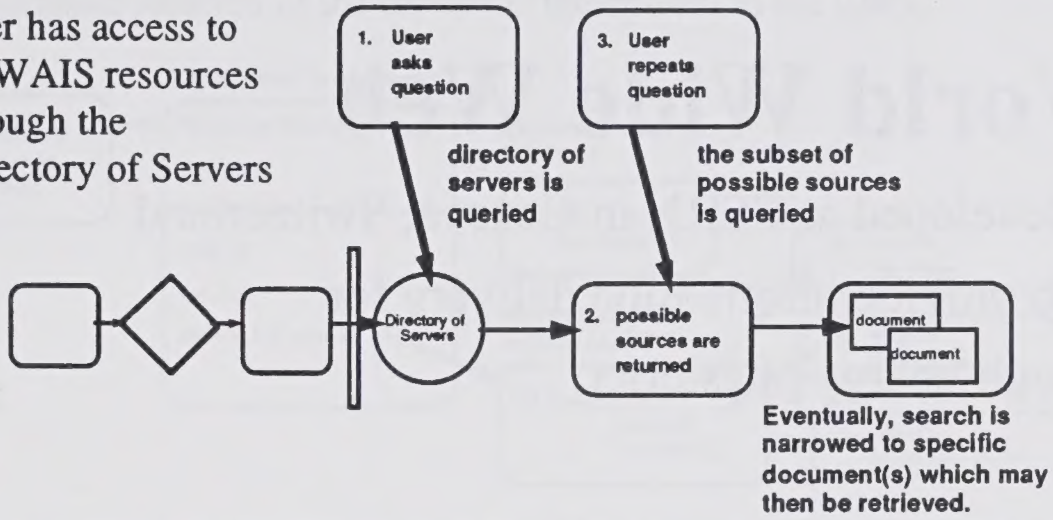
indexed textual description of local data

WAIS Directory of Servers

textual descriptions of all known servers

WAIS

User has access to all WAIS resources through the Directory of Servers



1. User asks question

directory of servers is queried

Directory of Servers

2. possible sources are returned

3. User repeats question

the subset of possible sources is queried

Eventually, search is narrowed to specific document(s) which may then be retrieved.

WAIS

Take WAIS for a test drive:

- telnet to **quake.think.com**
- and login as wais

Information Delivery on the Internet

World Wide Web

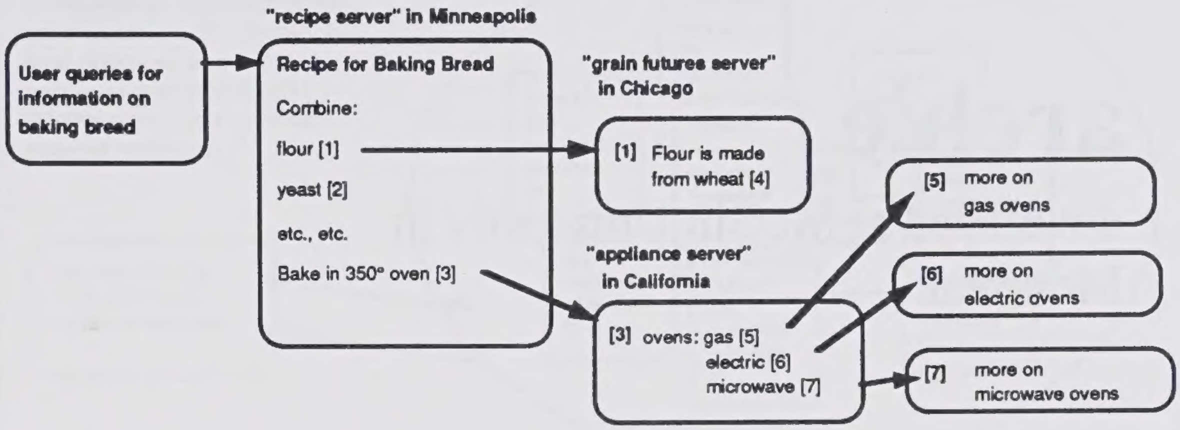
developed at CERN in Geneva, Switzerland to provide information delivery for high-energy physicists.

World Wide Web

- based on the hypertext concept

World Wide Web - Hypertext

Geographic location of the servers is transparent to the users.



User queries for information on baking bread

"recipe server" in Minneapolis

Recipe for Baking Bread

Combine:

flour [1]

yeast [2]

etc., etc.

Bake in 350° oven [3]

"grain futures server" in Chicago

[1] Flour is made from wheat [4]

"appliance server" in California

[3] ovens: gas [5]
electric [6]
microwave [7]

[5] more on gas ovens

[6] more on electric ovens

[7] more on microwave ovens

World Wide Web

Take W3 for a test drive:

- ❖ telnet to **info.cern.ch**
- ❖ and login as **www**

Information Delivery on the Internet

archie

developed at McGill University in Montreal

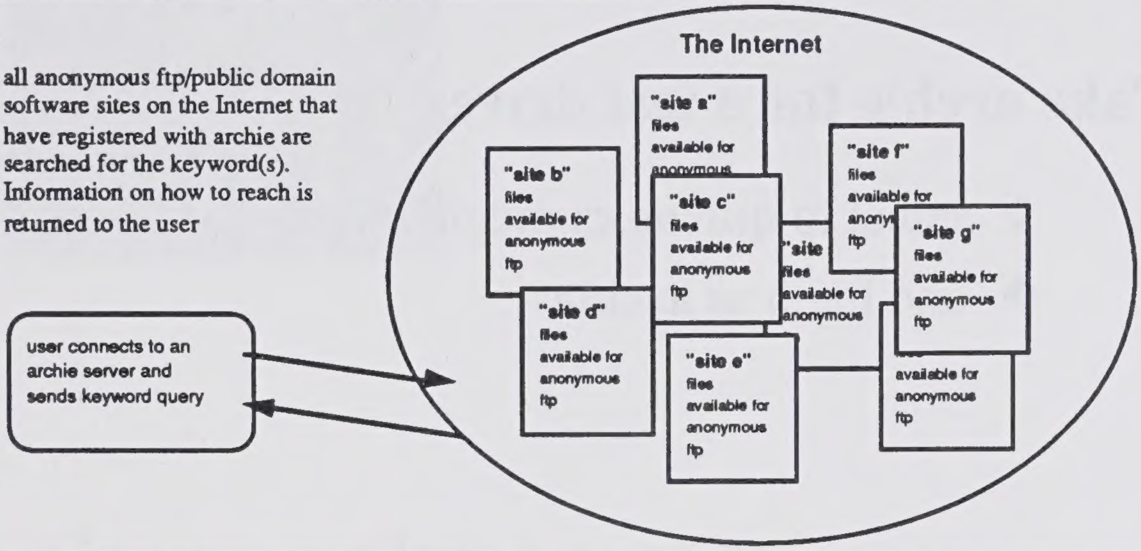
---

archie - Advantages

- ❖ locates files available for anonymous ftp
- ❖ searches on a keyword

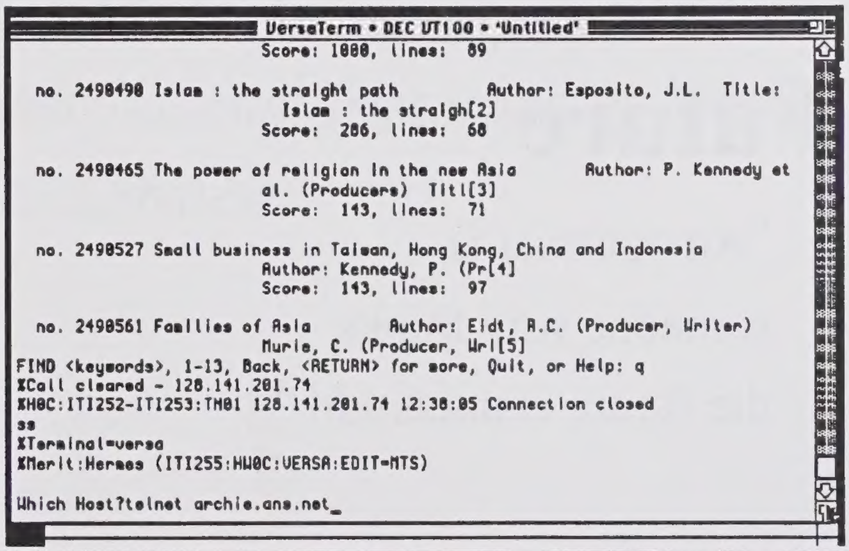
archie

all anonymous ftp/public domain software sites on the Internet that have registered with archie are searched for the keyword(s). Information on how to reach is returned to the user


The Internet
"site a" files available for anonymous
"site b" files available for anonymous ftp
"site c" files available for anonymous ftp
"site files available for anonymous
"site f" files available for anony ftp
"site g" files available for anonymous ftp
"site d" files available for anonymous ftp
"site e" files available for anonymous ftp
available for anonymous ftp
user connects to an archie server and sends keyword query

---

archie


VerseTerm • DEC VT100 • 'Untitled'

```
                         Score: 1000, lines:  89

  no. 2490490 Islam : the straight path        Author: Esposito, J.L.  Title:
                            Islam : the straigh[2]
                         Score:  286, lines:  68

  no. 2490465 The power of religion in the new Asia       Author: P. Kennedy et
                         al. (Producers)  Titl[3]
                         Score:  143, lines:  71

  no. 2490527 Small business in Taiwan, Hong Kong, China and Indonesia
                         Author: Kennedy, P. (Pr[4]
                         Score:  143, lines:  97

  no. 2490561 Families of Asia        Author: Eidt, R.C. (Producer, Writer)
                         Murie, C. (Producer, Wri[5]
FIND <keywords>, 1-13, Back, <RETURN> for more, Quit, or Help: q
%Call cleared - 128.141.201.74
%HBC:ITI252-ITI253:TM01 128.141.201.74 12:38:05 Connection closed
ss
%Terminal=versa
%Merit:Hermes (ITI255:HW0C:VERSA:EDIT=MTS)

Which Host?telnet archie.ans.net_
```

archie

Take archie for a test drive

- telnet to **quiche.cs.mcgill.ca**
- and login as **archie**

The Future

> "An optimist is
> someone who thinks
> the future is uncertain."

Community Access

the National Public Telecomputing Network

Tom Grundner
President, National Telecomputing Network
Cleveland Free-Net

BIOGRAPHICAL NOTES

T.M. Grundner, Ed.D
President, National Public Telecomputing Network

Tom Grundner is the president of the National Public Telecomputing Network, headquartered in Cleveland, Ohio. A native of Detroit he received his undergraduate degree in psychology from Eastern Michigan University; a masters degree in human learning from the Institute for Behavioral Research in Silver Spring, Maryland; a second masters in education from the University of Southern California; and a doctorate in educational philosophy, also from USC.

Dr. Grundner was an early pioneer in the development of community-based computerized information services. His "St. Silicon Project" at Case Western Reserve University in 1984 provided the first data on the effectiveness of using modem equipped microcomputers to deliver community health information. His Cleveland Free-Net Project in 1986 developed the nation's first free, open-access, community computer system. As a result of the success of the Free-Net, in 1989 he founded the National Public Telecomputing Network to foster the growth of community computer systems and to link them together into a common nationwide communications and information network similar to National Public Radio, or PBS on television.

In addition to his organizational and research activities, Dr. Grundner has written widely in both the professional and lay press. He was one of the nation's first newspaper computer columnists--writing a weekly column for the Cleveland Plain Dealer beginning in 1983--and has published books on topics ranging from computers, to ethical and regulatory issues in doing research with human subjects. He is also the founder of a successful for-profit company called the American Cybercasting Corporation, and for several years was a talk-show host on radio station WERE in Cleveland.

Among his many honors and awards are: the Alumni Achievement Award from Eastern Michigan University, the Award of Achievement in Education from *Northern Ohio LIVE* magazine, selection as an Outstanding Young Man of America by the U.S. Jaycees, and selection as one of the "Eighty-four Most Interesting People in Cleveland" by *Cleveland Magazine*. He is also a decorated veteran, having served with the U.S. Navy (in-country) Vietnam.

The National Public Telecomputing Network

The National Public Telecomputing Network

Community Computing and the National Public Telecomputing Network

The National Public Telecomputing Network (NPTN)

NPTN community computer systems represent the leading edge of what amounts to a new public service application for computers. Large multi-user machines are established in various communities to provide a wide range of computerized information and communications services in much the same way as the public library, for example, provides a similar function with the printed word. Anyone with a personal computer and a modem can use these systems 24 hours a day and, like the public library, these services are offered without charge to the individual user.

The concept behind our network is not new. You are probably familiar with National Public Radio and Public Broadcasting on T.V. To understand NPTN, simply substitute community computer systems for radio or television stations, and you have the core of what we hope to accomplish.

We are a 501(c)(3) nonprofit organization which is funded completely by voluntary membership dues from the users of our community computer systems, corporate and foundation grants, individual donations, and other fund-raising activities.

Objectives

NPTN has established specific objectives in three major areas:

1. To assist organizers in cities throughout the U.S. and the world in establishing free, open access, community computer systems. (For example: NPTN has established affiliates in five U.S. cities, with another 10 cities scheduled to go online in the next 12 months.)

2. To link those systems together into a common network similar to National Public Radio or PBS on T.V. (For example: NPTN has establish networkwide electronic mail and "cybercasting" services to all affiliates.)

(N.B. "Cybercasting" refers to the regular dissemination of information and communication services to NPTN affiliates. These services function like network feeds in the radio and television industry, where local station programming is supplemented on a regular basis by high quality network programs. Examples would include: Project Hermes, U.S. Supreme Court Decisions; the Congressional Memory, reports on legislation in Congress; USA TODAY electronic news service, etc.)

3. To establish networkwide special services and programs which take advantage of the unique strengths of telecomputing as a medium. (For example: Academy One, our K-12 education network; and the Teledemocracy Project.)

Background

NPTN has its origins in a series of research projects conducted at Case Western Reserve University (CWRU) in Cleveland, Ohio.

The initial project began in the fall of 1984 when Dr. Tom Grundner, then of CWRU's Department of Family Medicine, set up a single phone line, computerized, "bulletin board" system called "St. Silicon's Hospital and Information Dispensary" to test the effectiveness of telecomputing as a means of delivering health information to the public.

The heart of the system was an interactive area where lay people could call in using their home, school, or business computers, leave medically-related questions, and have them answered by a board certified family physician within 24 hours. The experiment proved so successful that it attracted the attention of the Information Systems Division of AT&T and the Ohio Bell Telephone Company, who supported a larger project to expand and develop this interactive concept.

Based on these donations, Dr. Grundner began work on a full-scale "community computer system" on an AT&T 3B2/400 computer with ten incoming phone lines. The initial system was designed to serve as a community information resource in areas as diverse as law, medicine, education, arts, sciences, and government—including free electronic mail services for the citizens of northeast Ohio. On July 16, 1986, this system, called the "Free-Net" sm was opened by Ohio Governor Richard Celeste and Cleveland Mayor George Voinovich and the project was officially underway.

Version I of the Cleveland Free-Net gathered over 7000 registered users from throughout the Cleveland metropolitan area and handled between 500-600 calls per day. In 1989, however, it moved into a second phase of development in a big way.

A new system was designed around six IBM-RT (Model 135) computers which would be linked together so that, from the user's standpoint, they would appear as one big machine. This new system would provide the Cleveland Free-Net with 96 megabytes of RAM (96 million characters of Random Access Memory), over five gigabytes of hard disk storage (five billion characters of hard disk), and would be easily capable of supporting over 100 simultaneous users.

In August, 1989 the Cleveland super-system opened on 48 phone lines—32 designated for the community, 16 for CWRU faculty and students—plus a connection to CWRU's fiber-optic campus network called CWRUnet, and a connection to an international network called the Internet. Within a year the system was averaging well over 3000 logins a day... then 4000 a day... then 5000... until today the Cleveland system handles over 6000 logins a day.

One of the central tenets of the project from the very beginning was that, if we were successful, we would attempt to give the software and our methodology the widest possible dissemination. With that goal in mind, in September 1989, the National Public Telecomputing Network was formed.

In July, 1986 the Cleveland Free-Net went online. In July, 1987, the Youngstown Free-Net began operation. In the first four months of 1990 we brought three more systems into the network: TriState Online in Cincinnati, Ohio; The Heartland Free-Net in Peoria, Illinois; and the Medina County Free-Net in Medina, Ohio—our first rural system.

From these beginnings, NPTN continues to develop and grow as the nation's first free public-access telecomputing network

The Concept of Community Computing

The development of community computer systems represents a new application in computing.

A multi-user computer is established at a central location and the machine is connected to the telephone system through a series of devices called modems. Running on the machine is a computer program that provides its users with everything from electronic mail services to information about health care, education, technology, government, recreation, or just about anything else the host operators would like to place on the machine.

Anyone in the community with access to a home, office, or school computer and a modem can contact the system 24 hours a day. They simply dial a central phone number, make connection, and a series of menus appear on the screen which allows them to select the information or communication services they would like. All of it is free and all of it can easily be accomplished by a first-time user.

The key to the economics of operating a community computer system is the fact that the system is literally run by the community itself. Everything that appears on one of these machines is there because there are individuals or organizations in the community who are prepared to contribute their time, effort, and expertise to place it there and operate it over time. This, of course, is in contrast to the commercial services which have very high personnel and information-acquisition costs and must pass those costs on to the consumer.

Couple this volunteerism with the rapidly-dropping costs of computing power, the use of inexpensive transmission technology, and public access computing becomes an economically viable entity.

A Civic Utility: Potential Impact on the Community

Who, exactly, benefits from community computing? To cite just a few examples:

- *The Citizens of a Given Community*: First and foremost, these community computer systems open up information services to very large populations that would otherwise not be able to afford it. The cost of utilizing a Free-Net community computer consists of the cost of having standard telephone service in the home, school, or business, plus the price of the equipment needed to get online. Minimum equipment is now well under $250 virtually anywhere, and that is assuming the person purchases new. If a person wishes to attend a few garage sales, flea markets, or computer fairs, it could be considerably less. With the addition of public access terminals in a city, anyone would be able to utilize one of these systems.

- *Public and Private Schools:* Via community computers, school systems finally have a cost-effective way to teach telecomputing to their students, thereby sending a new generation of information-literate citizens into the work force. In addition, these systems allow students, teachers, parents, and administrators to communicate with each other and have access to information bases of interest and importance.

- *Government:* Community computers provide citizens with an inexpensive and rapid way to make contact with their elected representatives at the city, county, state, and national levels—contacts which include everything from obtaining information on governmental services to providing access to tax-payer supported, governmentally-produced databases. It should also be pointed out that these communications are not one way. Elected representatives and other officials also have the ability to electronically communicate with their constituents.

- *Small- and Medium-sized Businesses:* Most major corporations have electronic mail and other computer-driven information services at their disposal. Most small- and medium-sized businesses do not. With a Free-Net system in place, these smaller enterprises are finally able to afford to link their operations together via Free-Net electronic mail services and have access to a variety of useful business databases—something that cannot help but improve the business infrastructure of any city.

- *The Agricultural Community:* Among the segments in our society that were the first to embrace computing were our farmers. The reason was obvious. Farmers are business people too, but they have the disadvantage of, in general, being dispersed over wide geographic areas. A Free-Net system in a central location in a county allows the agricultural community to access common information bases, share solutions to farm-related problems, access up-to-date crop and price information, and make electronic connection with the County Agent and each other—all without ever leaving home.

- *The Telecommunications and Videotex Industry:* For years the commercial videotex industry has been dividing, sub-dividing, and sub-sub-dividing essentially the same "up-scale" demographic group: $50,000+ yearly household incomes, very well educated, overwhelmingly white, and overwhelmingly male. If the industry is to survive and flourish, however, it is going to have to find a way to penetrate the middle class with its services. Free-Net community computers do exactly that. On the Cleveland system, for example, we draw as many users out of the demographically blue collar areas of the city as we do out of the wealthier sections. Demographic penetration such as this, on a nationwide basis, is vital if the telecomputing and videotex industry is to survive into the 21st century. It is also important to the telephone industry, which has spent millions of dollars on "gateway" technology, that telecomputing flourish and that their services be used.

• *Community Organizations and Institutions:* Each Free-Net is set up using an "Electronic City" motif. That motif was not selected by accident. To one degree or another, virtually every institution in society has an information dissemination function of some kind—a need to tell others about itself and share its knowledge. The Free-Net makes it possible for any and all of them to utilize a new medium to accomplish that goal. From artistic and cultural organizations to medical institutions to hobbyists of all kinds, all can find a place on a community computer.

The Greening of a Medium

As a result our experience in working with and developing these systems, we have learned several very important things.

First, it is clear that these community computers represent the leading edge of what can only be described as a new telecommunications medium. Telecomputing is not radio, not television, not print, but has characteristics of all three plus additional ones all its own. This fact alone will inevitably lead to developments and uses that we cannot now even begin to imagine.

Second, it is clear that a critical mass of people now exist who are prepared to utilize this new medium. As more and more modem-equipped microcomputers penetrate the home and especially the work environment, the utility of public-access computerized information services goes up.

And third, there is a certain sense of inevitability to the development of community computing. Simply stated, we find ourselves unable to imagine a 21st century in which we do NOT have community computer systems, just as this century has had public libraries. Moreover, we believe that the community computer, as a resource, will have at least as much impact on the next century as the public library has had on ours.

The library analogy we just used is equally valid as an historical analogy. In the latter part of the last century there was no such thing as the free public library, at least not as we know it today. Eventually the literacy rate became high enough (and the cost of books became cheap enough) that the public library became feasible. People in cities and towns all across the country banded together to make free public access to the printed word a reality. The result was a legacy from which virtually every person reading this document has, at one point or another, benefited.

We believe it is time to leave a legacy of our own.

We believe we have reached the point where computer "literacy" has gotten high enough (and the cost of equipment low enough) that a similar demand has formed for free, public-access, computerized information systems. Indeed, we believe we have reached a point where the question is no longer *whether* it will happen; the question is "who" and "when." *Who* will do it and *when* will it happen?

The National Public Telecomputing Network exists to make free public access to computerized communications and information services a reality—to hand down a legacy to our children's children as great as the one handed to us.

For More Information

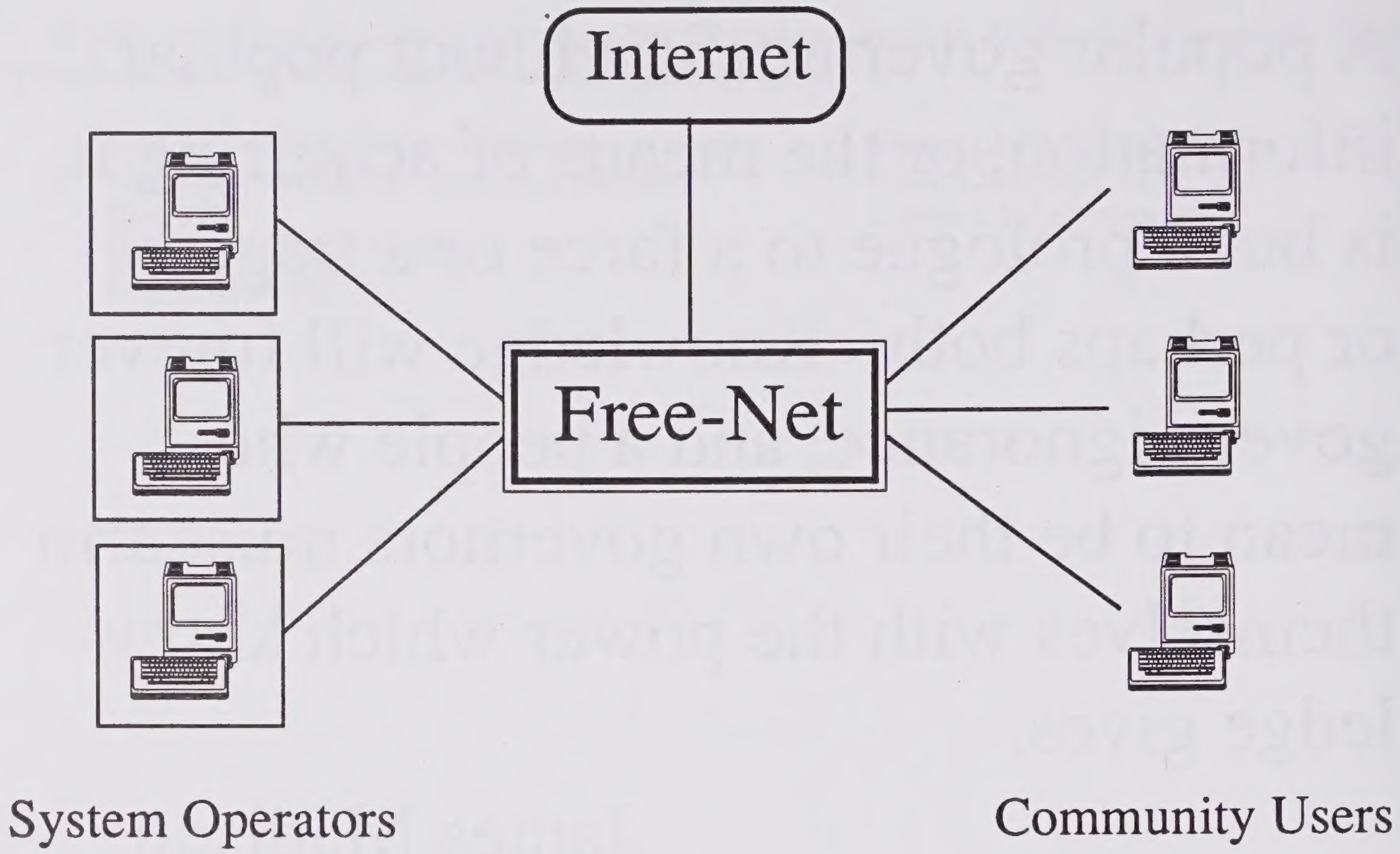
If you would like to know more about NPTN and our work in developing community computer systems, please feel free to contact us at the following:

T.M. Grundner, Ed.D. - President
National Public Telecomputing Network
Box 1987
Cleveland, Ohio 44106
(tmg@nptn.org)

Voice: (216) 368-2733
FAX: (216) 368-5436
Internet: info@nptn.org

A popular government without popular information, or the means of acquiring it, is but a prologue to a farce or a tragedy, or perhaps both. Knowledge will forever govern ignorance, and a people who mean to be their own governors must arm themselves with the power which knowledge gives.

James Madison


Internet
Free-Net
System Operators
Community Users

Who Benefits...

- The Citizens of a Community
- Elementary and Secondary Schools
- Government
- Small- and Medium Sized Businesses
- The Agricultural Community
- The Telecommunications Industry
- Community Organizations

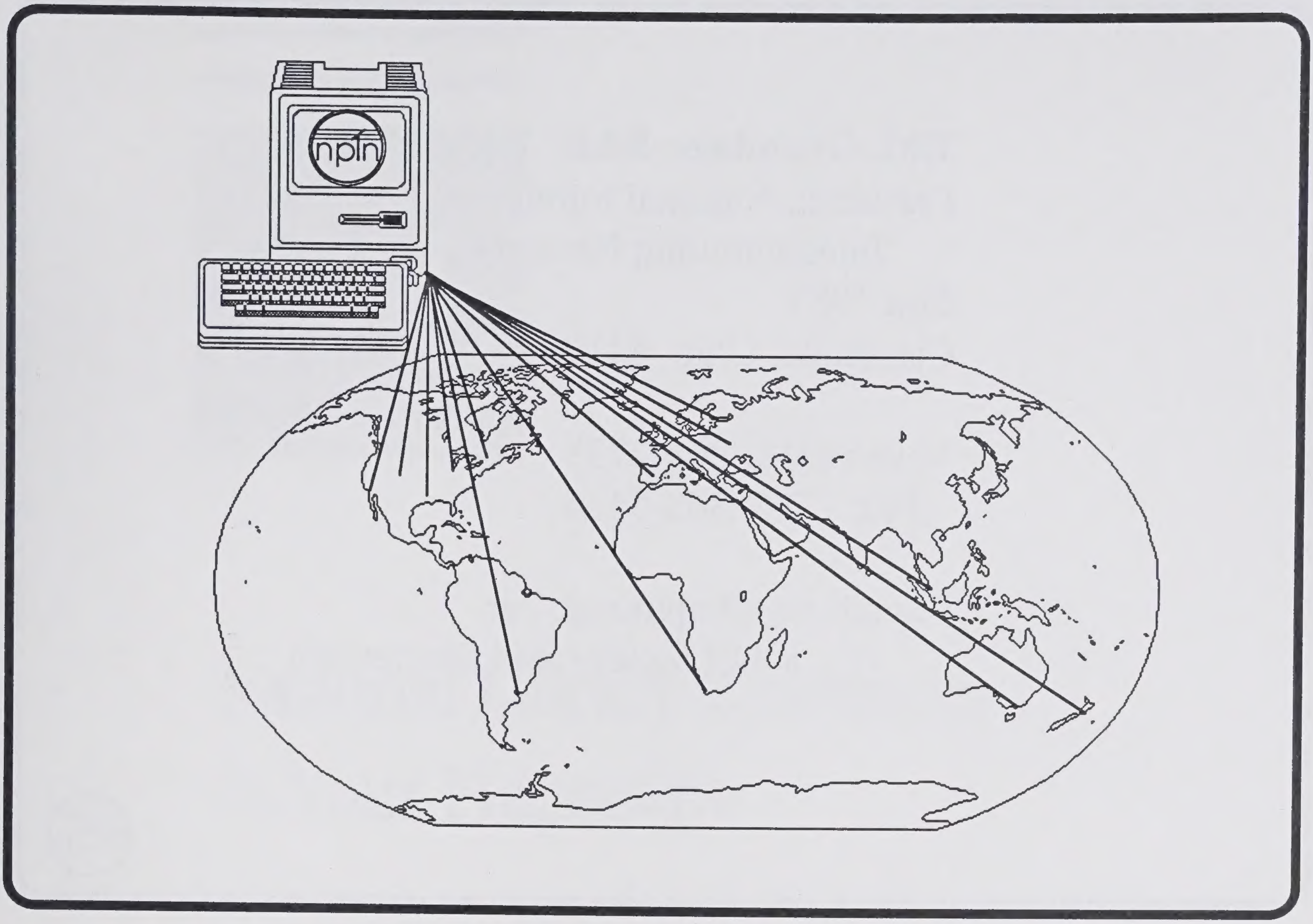
The Purposes of the Corporation for Public Cybercasting:

1. To establish free public access computerized information and communications services (community computers) in cities and towns throughout the U.S.

2. To provide those community computers with limited but guarenteed free access to the Internet and or any successor network such as the National Research and Education Network (NREN).

3. To develop high-quality, national-scope, information services and features for these community computers to supplement what each community is able to produce on its own.

4. To develop special programs to introduce telecomputing to the general public with special emphasis on K-12 students and teachers, senior citizens, and minority populations.


nptn

T.M. Grundner, Ed.D
President, National Public
Telecomputing Network
Box 1987
Cleveland, Ohio 44106

Voice: (216) 368-2733
Fax: (216) 368-5436

E.mail: tmg@nptn.org or
aa001@cleveland.freenet.edu

THE MERIT NETWORKING SEMINARS

National Library Resources at Your Fingertips

Ron Larsen
Associate Director for Information Technology
University of Maryland Libraries

BIOGRAPHICAL NOTES

Ronald L. Larsen, Ph. D.
Associate Director for Information Technology
University of Maryland Libraries

Ron Larsen is the Associate Director of Libraries for Information Technology and is an Affiliate Associate Professor of Computer Science at the University of Maryland at College Park. In this position he is responsible for managing the implementation and operation of a state-wide integrated Library Information Management System (LIMS) to meet the evolving needs of the State-wide libraries of the University of Maryland System. He currently represents EDUCOM on the Library of Congress Network Advisory Committee.

Prior to this position, Dr. Larsen was the Assistant Vice Chancellor for Computing at the University of Maryland System Administration. Before joining the University of Maryland in 1985, he served as Program Manager for Computer Science and Automation Research at NASA Headquarters in Washington, D.C., a post he held for five years. Before coming to NASA Headquarters, Dr. Larsen spent twelve years at NASA Goddard Space Flight Center where he developed real-time mission support systems, performed research in computing and communications systems architecture and managed research programs exploring future space mission support systems architectures.

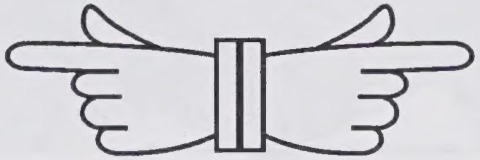
Dr. Larsen holds a B.S. in Engineering Sciences from Purdue University, an M.S. in Applied Physics from the Catholic University of America, and a Ph.D. in Computer Science from the University of Maryland at College Park.

National Library Resources at Your Fingertips

Making Your Internet Connection Count

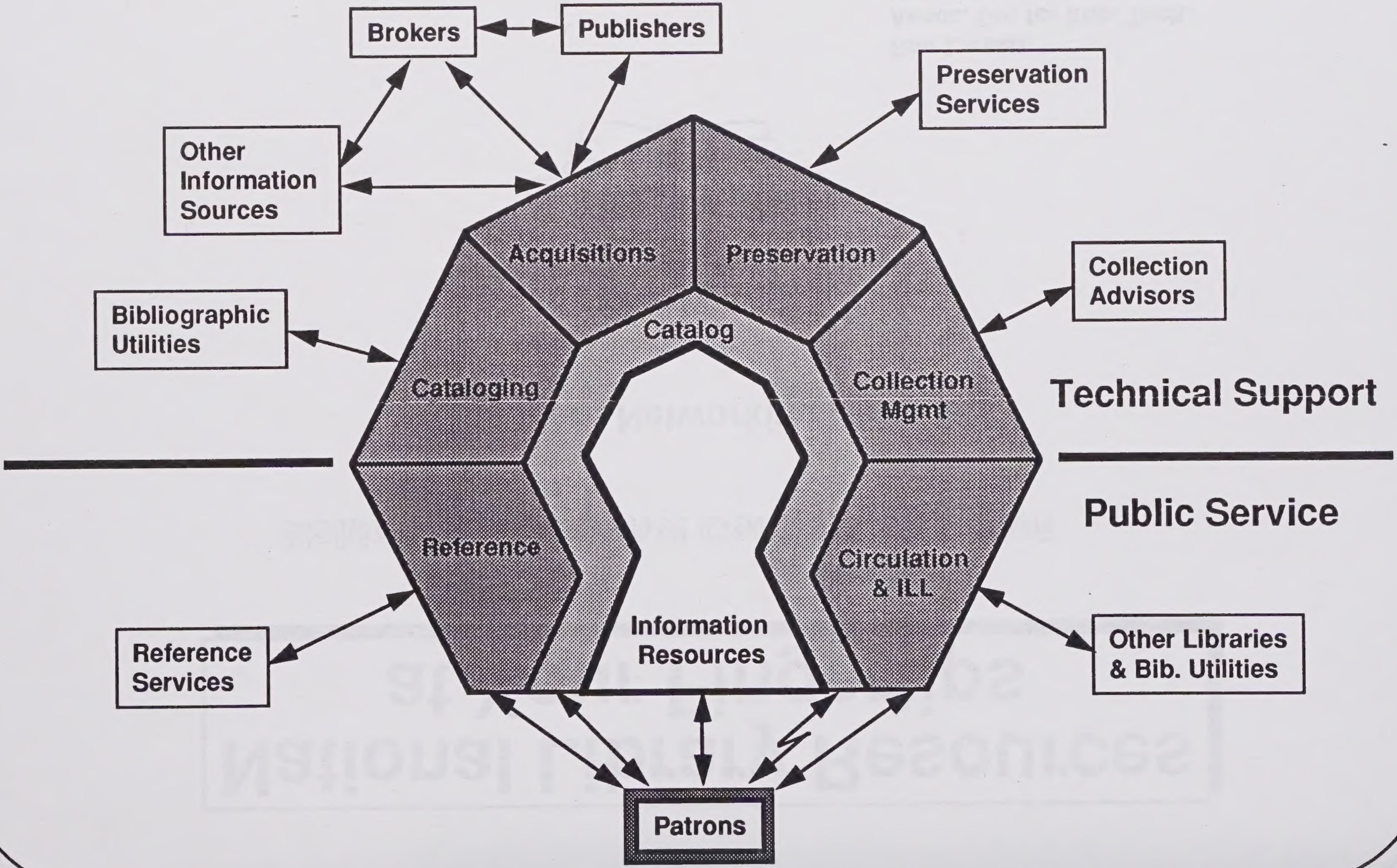
The Merit Networking Seminars

October 19, 1992

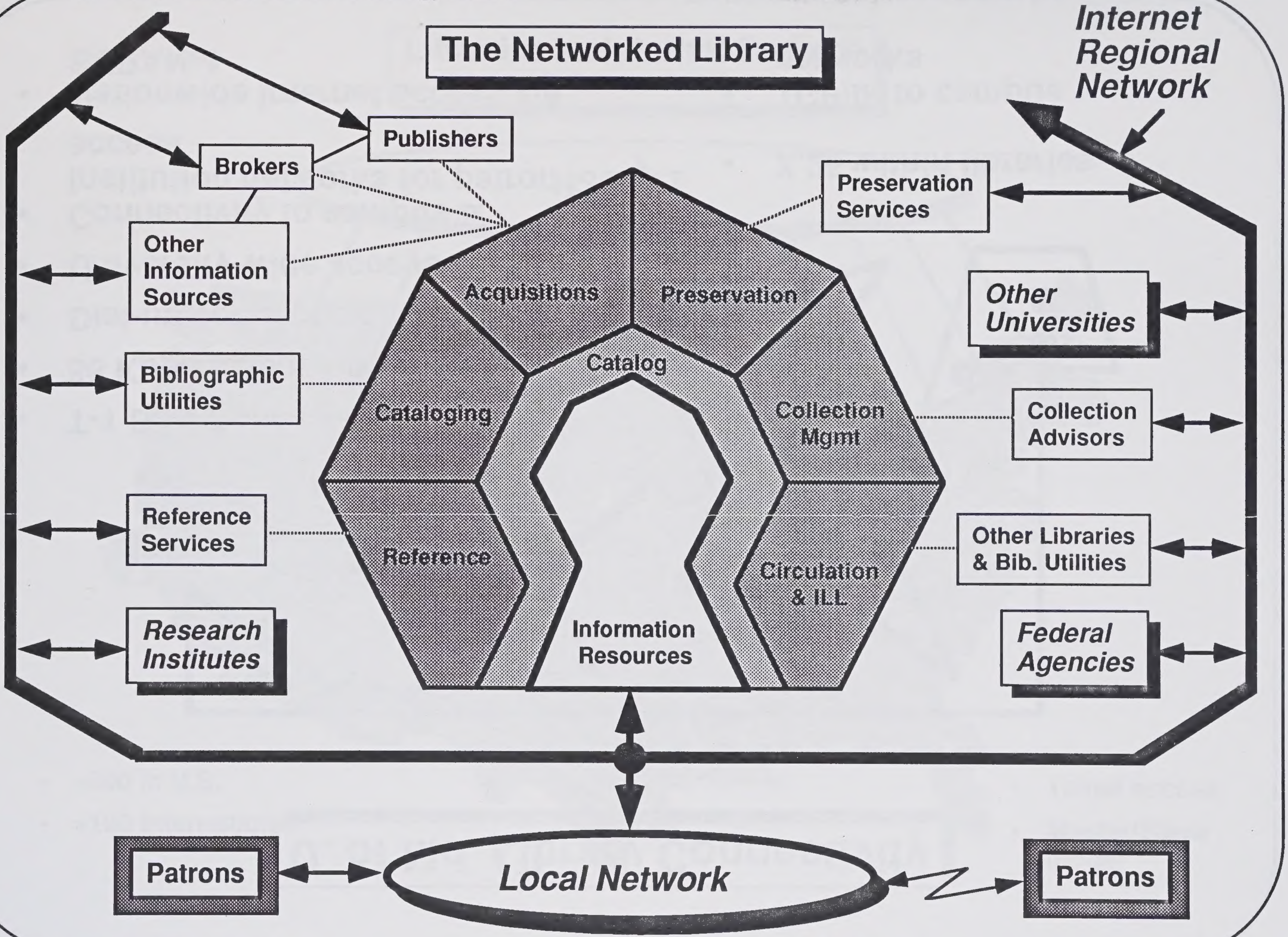


Ron Larsen
Assoc. Dir. for Info. Tech.
Univ. of Md. Libraries
301-405-9194
RLarsen@libr.umd.edu

Library Functions & Interfaces


Brokers
Publishers
Preservation Services
Other Information Sources
Acquisitions
Preservation
Collection Advisors
Bibliographic Utilities
Catalog
Cataloging
Collection Mgmt
Technical Support
Public Service
Reference
Circulation & ILL
Information Resources
Reference Services
Other Libraries & Bib. Utilities
Patrons

The Networked Library



Internet
Regional
Network

Publishers

Brokers

Other Information Sources

Bibliographic Utilities

Reference Services

Research Institutes

Preservation Services

Other Universities

Collection Advisors

Other Libraries & Bib. Utilities

Federal Agencies

Acquisitions

Preservation

Cataloging

Catalog

Collection Mgmt

Reference

Circulation & ILL

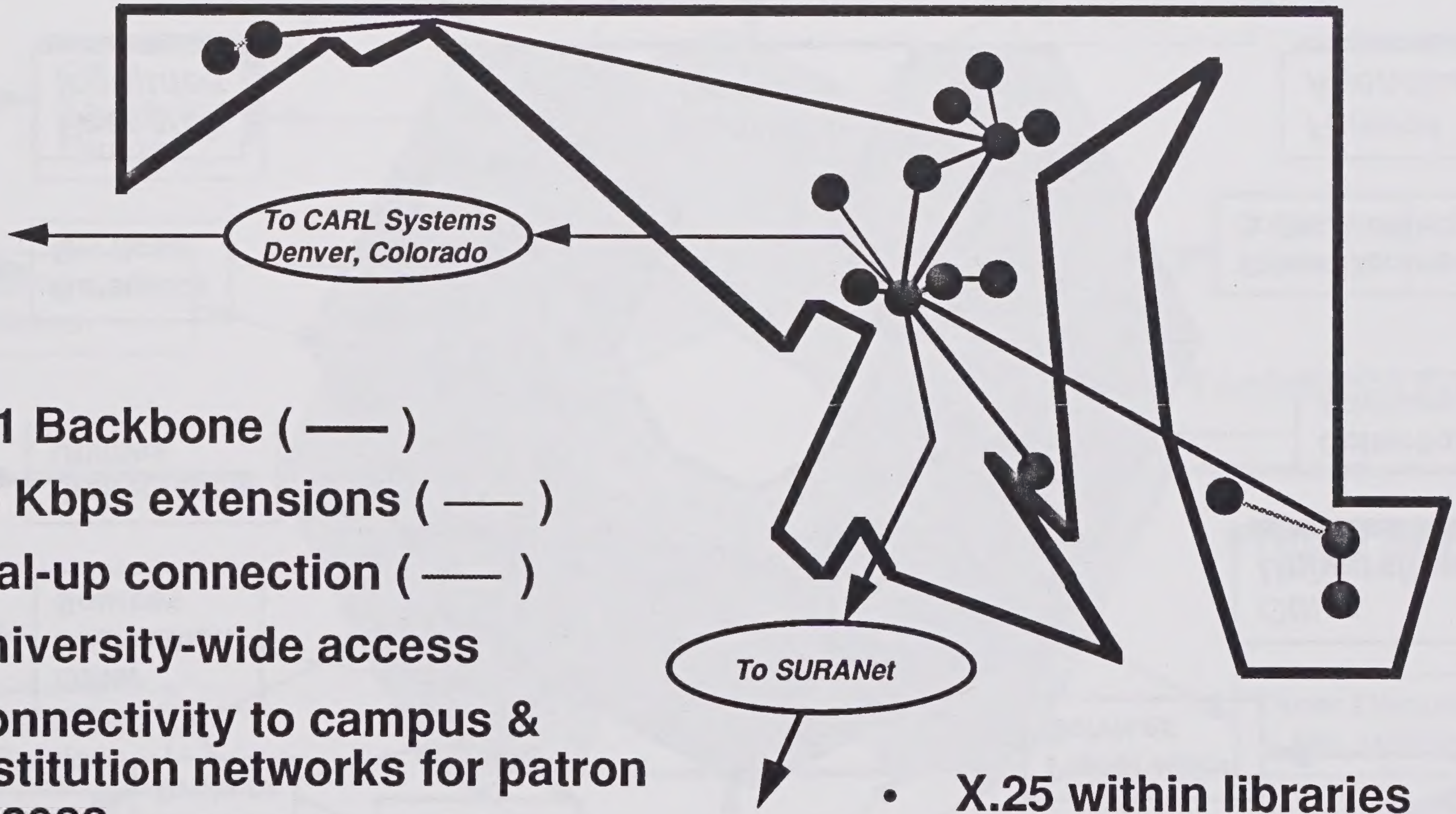
Information Resources

Patrons

Local Network

Patrons

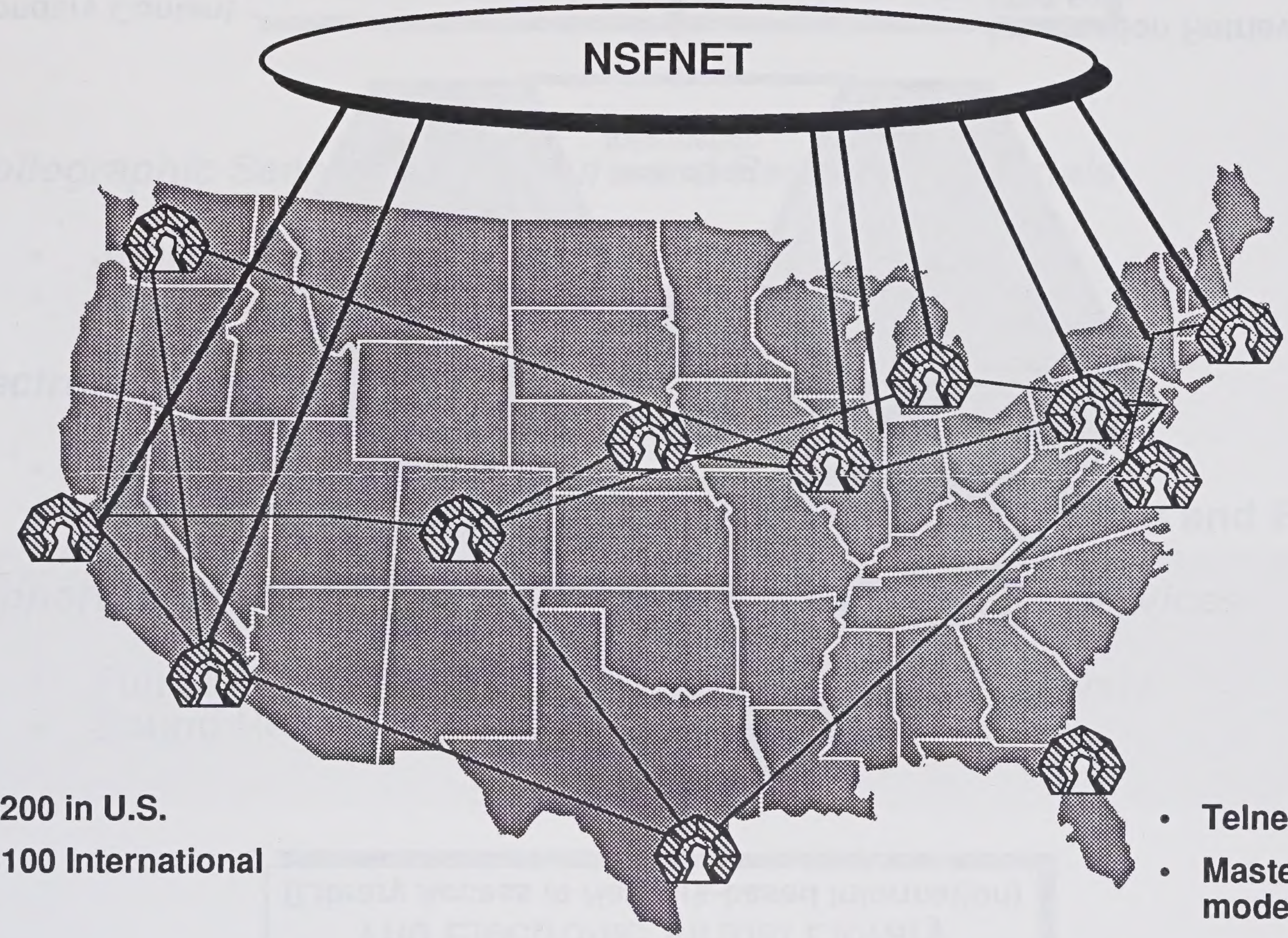
U. of Md. Library Connectivity


To CARL Systems
Denver, Colorado
To SURANet

- **T-1 Backbone (——)**
- **56 Kbps extensions (——)**
- **Dial-up connection (——)**
- **University-wide access**
- **Connectivity to campus & institution networks for patron access**
- **Nationwide Internet access via SURANet**

- **X.25 within libraries**
- **TCP/IP to campus networks**

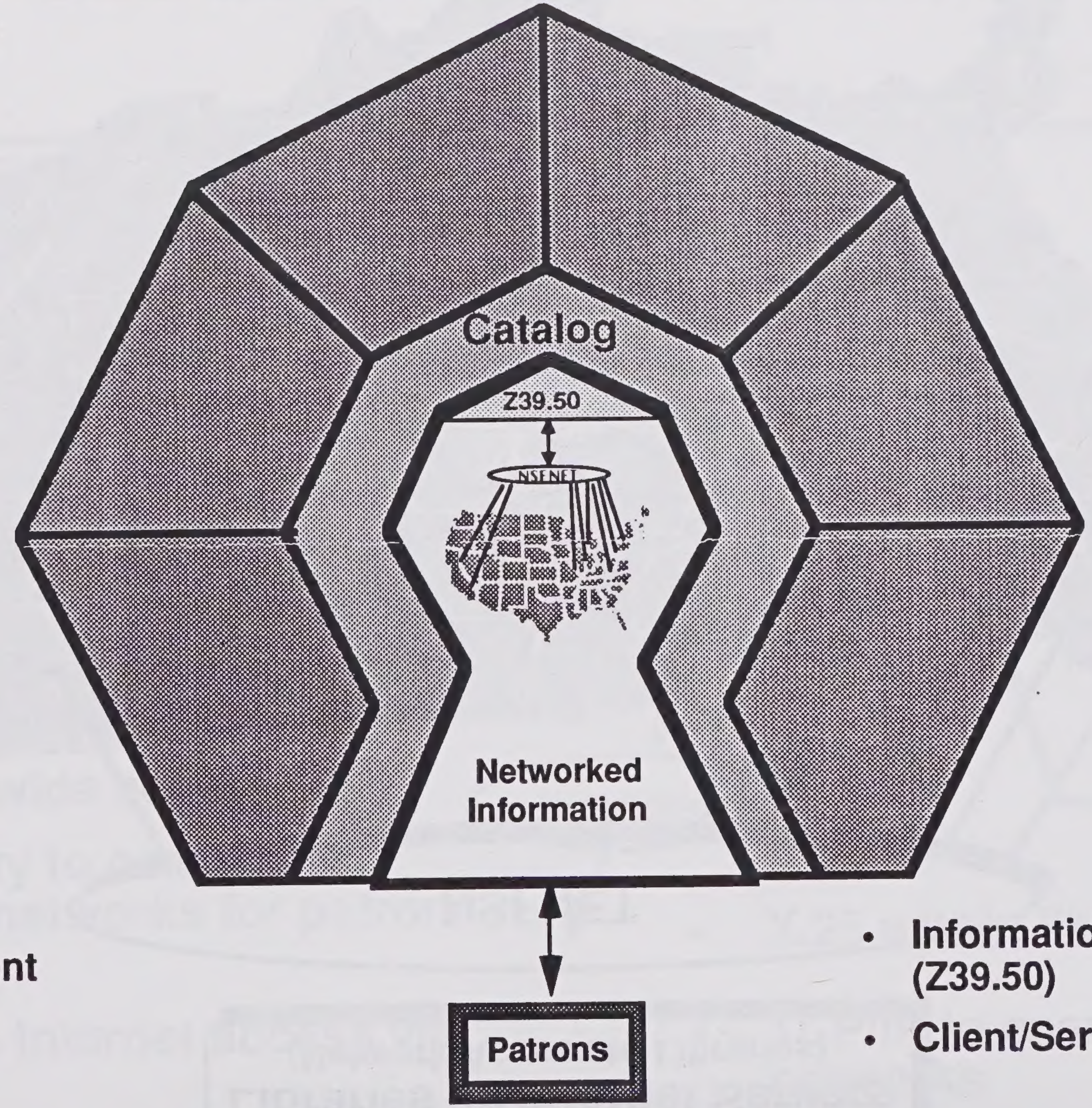
Libraries as Internet Servers
(Network Access to Libraries)



- ≈200 in U.S.
- >100 International

- Telnet access
- Master/Slave model

The Electronic Virtual Library
(Library Access to Network-based Information)


Catalog
Z39.50
NSFNET
Networked Information
Patrons

- Secondary Content
- Primary Content

- Information Retrieval Protocol (Z39.50)
- Client/Server model

Networked Library Functions & Facilities

Bibliographic Search of Literature and Research Materials

- Journal Articles
- Research Abstracts
- Books
- Databases

Electronic Browsing and Delivery of Information

- Tables of Contents
- Indexes
- Bit-map Images
- Full Text with Graphics and Figures

Support for MultiMedia and HyperMedia Publications & Services

- Full Motion Video
- Sound Recordings
- Software / Courseware
- Hypermedia

Today - Expansion & Experimentation

Search **>300 online library catalogs using native interface**
- Academic libraries
- Public libraries
- Library of Congress

Access **online databases**
- Space / Ocean / Agriculture / Social Science
- Software archives
- Weather / Geography

Subscribe **to electronic publications**
- >38 journals (13 peer reviewed)
- >65 newsletters

Read **full-text reports**
- GAO
- Supreme Court opinions

Order **documents from other libraries**
- Fax delivery (e.g., CARL's UnCover2)
- Scanned bit-map images (e.g., NAL/NCSU text digitization)

Today - "AAA Travel Guides"

Destination-based access tools

- Directories (e.g., St. George, Barron, ...)
- Internet Resources Guide (BB&N)
- Online Gateways (e.g., WUGATE)
- Hypertext Guides (e.g., HYTELNET)

Home rule applies

- Access tools (only) open the door
- Effective usage requires expertise, familiarity, or (at least) tolerance for local conventions, commands, and protocols

Access Instructions

- ## Directories

Art St. George's Directory:

```
ftp ariel.unm.edu
username:  anonymous
password:  your e-mail address
ftp>  cd library
ftp>  get internet.library
ftp>  quit
```

Billy Barron's Directory:

```
ftp ftp.unt.edu
username:  anonymous
password:  your e-mail address
ftp>  cd library
ftp>  get libraries.txt
ftp>  quit
```

- ## Internet Resources Guide (BB&N)

```
ftp nnsc.nsf.net or 128.89.1.178
username:  anonymous
password:  your e-mail address
ftp>  cd resource-guide
ftp>  ls (this will list the available files, which can
         be retrieved by ...)
ftp>  get filename
ftp>  quit
```

- ## Online Gateway (WUGATE)

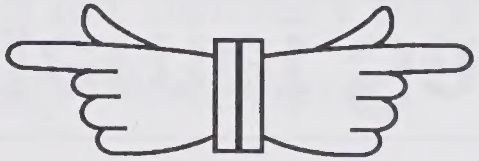
```
telnet wugate.wustl.edu
login:  library
```

- ## PC-based Hypertext Guide (HYTELNET)

```
ftp ftp.unt.edu
username:  anonymous
password:  your e-mail address
ftp>  binary
ftp>  cd library/hytelnet/pc
ftp>  get HYTELN62.ZIP
ftp>  get PKUNZIP.EXE
ftp>  quit
pkunzip hyteln40.zip
```

Tomorrow - Integration & Interoperability

- **Access from library catalog to primary content of local collections**
- **Client / Server protocol (Z39.50) for extensibility of local search interface to remote catalogs**
- **Client / Server protocol (Z39.63) for interlibrary loan requests**
- **Evolution to network-based virtual library providing uniform search of remote library catalogs with real-time delivery of locally-held materials in electronic formats**



An Internet Sampler

- **Using an online directory**
  Washington University (St. Louis)
- **Performing correlative research on full-text databases**
  Dartmouth College
- **Searching a remote library catalog**
  University of California
- **Finding a book review**
  CARL Systems (Denver)
- **Retrieving the local weather forecast**
  University of Michigan
- **Ordering fax delivery of a journal article**
  University of Maryland

Finding Your Way ...

- **Using an online directory**
  *Washington University (St. Louis) - **WUGATE***
- **Performing correlative research on full-text databases**
  Dartmouth College
- **Searching a remote library catalog**
  University of California
- **Finding a book review**
  CARL Systems (Denver)
- **Retrieving the local weather forecast**
  University of Michigan
- **Ordering fax delivery of a journal article**
  University of Maryland

```
telnet wugate.wustl.edu
Trying 128.252.120.1...
Connected to wugate.wustl.edu.
Escape character is '^]'.


ULTRIX V4.2A (Rev. 47) (wugate.wustl.edu)

login: library

  SSSSSSS
 SSSSSSSSS
 SS          EEEEE  RRRRRR    VV   VV  IIIIII   CCCCC    EEEEE   SSSSS
 SSSSSSSS   EEEEEE  RR   RR   VV   VV    II    CCCCCCC  EEEEEE  SSSSSS
  SSSSSSSS  EE      RR   RR   VV   VV    II    CCC      EE      SS
        SS  EEEEEE  RRRRRR    VV   VV    II    CCC      EEEEEE   SSSS
        SS  EE      RR   RR   VV   VV    II    CCC      EE          SS
 SSSSSSSS   EEEEEE  RR   RR    VV VV     II    CCCCCCC  EEEEEE  SSSSSS
  SSSSSS     EEEEE  RR    RR    VVV    IIIIII   CCCCC    EEEEE   SSSS


    O f f i c e   o f   t h e   N e t w o r k   C o o r d i n a t o r
               W a s h i n g t o n   U n i v e r s i t y
                      i n   S a i n t   L o u i s


    As seen in "Zen and the Art of the Internet" by Brendan P. Kehoe



Washington University Services
Version 2.2.0
==============================




Menu]===============================================================
   1. About Washington University Services
   2. Washington University Services
   3. United States Libraries
   4. Foreign Libraries
   5. Government Libraries and Public Accessible Databases
   6. Campus Wide Information Systems
   7. All Services
   8. Recent Additions
   9. Weather Forecast for US/Canada
  10. QUIT the Washington University Services program

======================================================================
```

Accessing Original Sources ...

- **Using an online directory**
  Washington University (St. Louis)
- **Performing correlative research on full-text databases**
  *Dartmouth College - **Shakespeare, Bible, Dante***
- **Searching a remote library catalog**
  University of California
- **Finding a book review**
  CARL Systems (Denver)
- **Retrieving the local weather forecast**
  University of Michigan
- **Ordering fax delivery of a journal article**
  University of Maryland

```
 The following files are available for searching in the Dartmouth
 College Library Online System.  Type one of the file names listed, or
 type HELP for more information, or press BREAK to cancel your command.

 The online library catalog:
    CATALOG - the complete catalog, including BOOKS, SERIALS and ORDERS
    BOOKS - books, maps, sound recordings, microforms, etc.
    ORDERS - on order and in process materials
    SERIALS - journals, periodicals, magazines, newspapers, etc.

 Reference materials:
    DICTIONARY - American Heritage Electronic Dictionary
    ENCYCLOPEDIA - Grolier's Academic American Encyclopedia, in full text

 Indexes to the journal literature:
    DARTMED - a subset of the National Library of Medicine's MEDLINE file
    MESH - Medical Subject Headings from NLM, used in the DARTMED file.
    MLA BIBLIOGRAPHY - materials in literature, folklore and linguistics.

 Complete texts of literature and scholarly works:
    BIBLE - the King James Version of the Bible
    SHAKESPEARE PLAYS - thirty-three plays by Shakespeare
    SHAKESPEARE SONNETS - all of Shakespeare's Sonnets

 Indexes to other library-owned materials:
    GMAJOR - index to the Williams/Watson sheet music collection
    NH NEWSPAPERS - index to the New Hampshire Newspaper project holdings
    PLAYBILL - index to the Williams/Watson collection of theater programs
    THESPIS - index to the Williams/Watson Theatre Collection of clippings

 Indexes to other materials available at Dartmouth:
    COMPUTING SERVICES DOCUMENTATION - Publications about Dartmouth Computing

==============================================================================

-> SELECT FILE shakespeare plays

You are now searching the experimental Shakespeare Plays file.  It consists of the full
text of thirty-three of Shakespeare's plays, taken from Arthur Bullen's Stratford Town
Edition.  The plays included are:

Macbeth     Twelfth Night      As You Like It          The Two Gentlemen of Verona
Othello     King Henry V       A Comedy of Errors      A Midsummer Night's Dream
King Lear   Julius Caesar      Antony and Cleopatra    King Henry IV (Part I)^@
King John   Timon of Athens    Measure for Measure     King Henry IV (Part II)
Cymbeline   Romeo and Juliet   Troilus and Cressida    Much Ado About Nothing
Pericles    Titus Andronicus   Love's Labour's Lost    The Taming of the Shrew
Hamlet      King Richard II    The Winter's Tale       The Merry Wives of Windsor
King Richard III               The Tempest             King Henry VI (Part II)
The Merchant of Venice                                 King Henry VI (Part III)

-> find text caesar augustus
```

```
Searching...FIND TEXT CAESAR AUGUSTUS

Result S2: 1 items in the SHAKESPEARE PLAYS file.

Play:      CYMBELINE.
 Act:      ACT III.
Scen:      SCENE I.
Text:      Britain. A room of state in Cymbeline's palace.  Enter in state CYMBELINE,
QUEEN, CLOTEN, and LORDS at one door, and at another CAIUS LUCIUS and ATTENDANTS.

CYMBELINE.        Now say, what would Augustus Caesar with us?

CAIUS LUCIUS.     When Julius Caesar, whose remembrance yet
                  Lives in men's eyes and will to ears and tongues
                  Be theme and hearing ever, was in this Britain
                  And conquer'd it, Cassibelan, thine uncle,
                  Famous in Caesar's praises, no whit less
                  Than in his feats deserving it,- for him
                  And his succession granted Rome a tribute,
                  Yearly three thousand pounds; which by thee lately
                  Is left untender'd.

QUEEN.            And, to kill the marvel,
                  Shall be so ever.

CLOTEN.           There be many Caesars,
                  Ere such another Julius.
                  Britain is world by itself; and we will nothing pay
                  For wearing our own noses.

-> select file bible

==========================================================================================

You are now searching the King James Version of the Bible.

Each item, or document, that you retrieve is a single chapter of one
Book of the Bible.  Each item contains a Book name, a Chapter number,
and many Verses.

You can search the following indexes:
     GENERAL -   finds your words anywhere in the Chapter.
     TEXT -      finds all Chapters containing your words in the same Verse.
     BOOK -      finds all Chapters of that Book (FIND BOOK EXODUS)
     CHAPTER -   use this in conjunction with BOOK, to find a specific Chapter of a
                 specific Book (F BOOK GENESIS AND CHAPTER 4)

There are no stopwords.

The books classed as the Apocrypha are not in this version of the Bible.

-> find text caesar augustus
```

```
Searching...

Search S1: FIND TEXT CAESAR AUGUSTUS
Result S1: 2 items in the BIBLE file.

1. Luke 2  And it came to pass in those days, that there went out a decree f...
2. The Acts 25   But when Paul had appealed to be reserved unto the hearing of

-> display long

   Book: Luke
Chapter: 2
  Verse: 1 And it came to pass in those days, that there went out a decree from Caesar
Augustus that all the world should be taxed.  2 (And this taxing was first made when
Cyrenius was governor of Syria.)  3 And all went to be taxed, every one into his own
city.  4 And Joseph also went up from Galilee, out of the city of Nazareth, into
Judaea, unto the city of David, which is called Bethlehem; (because he was of the house
and lineage of David:)  ...
```

```
United States Libraries
    1. Alabama              20. Nebraska
    2. Arkansas             21. Nevada
    3. California           22. New Hampshire
    4. Colorado             23. New Jersey
    5. Delaware             24. New Mexico
    6. Florida              25. New York
    7. Georgia              26. North Carolina
    8. Hawaii               27. Ohio
    9. Illinois             28. Oklahoma
   10. Indiana              29. Oregon
   11. Iowa                 30. Pennsylvania
   12. Kansas               31. Rhode Island
   13. Maine                32. South Carolina
   14. Maryland             33. Tennessee
   15. Massachussetts       34. Texas
   16. Michigan             35. Utah
   17. Minnesota            36. Vermont
   18. Mississippi          37. Virginia
   19. Missouri             38. Wisconsin

=======================================================================

    1. Dartmouth Dante Database  <--- Out-of-date access information
    2. Dartmouth Library         <--- Go here & type "connect dante" instead
    3. University of New Hampshire VideoTex

==========================
  DARTMOUTH DANTE DATABASE
  Address:
  Dartmouth Dante Project
  1 Reed Hall, HB 6087
  Dartmouth College
  Hanover NH 03755
  e-mail: dante@dartmouth.edu
  (603)646-2633

  Description:The Dartmouth Dante database contains 600 years of line-by-line
  commentary to Dante's Divine Comedy, as well as the Petrocchi version of
  the poem itself. All texts are in their original languages (Italian,
  Latin, and English) with no translations. Ancient commentaries have been
  parsed  for the users' convenience. The search program utilized is
  BRS/Search.

  Who Can Use the Database:
Anyone may access the database. There are currently no fees connected with the
service.   A  public  demonstration  account  (ddpdemo)  is  available,  and
personal/institutional accounts are available upon request. The database is
accessible by direct modem connection,  the Telenet network, or the Internet.
  FOR MORE INFORMATION, CONTACT
      Janet Stephens (Administrator), siena@dartmouth.edu
  --- Press "c" to connect to system ---
  --- Press "u" to return to the menu system ---
```

```
Welcome to the Dartmouth College Library Online System
Copyright 1987 by the Trustees of Dartmouth College

The BOOKS IN PRINT file is available for searching.  Type SELECT FILE
BOOKS IN PRINT to search it.

There are six new remote systems available (E-MATH, TRIPOD, TUFTS, ALEPH,
AMIGOS, KONSTANZ). Type SHOW NEWS for more information. (10 Sep 1992)

The WORLD FACTBOOK FILE now contains 1991 data.  Type SELECT FILE WORLD
FACTBOOK to search it. (26 June 1992)

Type SHOW NEWS for information about new developments in the Online
System.

You are now searching the CATALOG file.  To search another file,
type SELECT FILE.Type one of the following commands, or type HELP for more
information:
    FIND   - to search     SELECT FILE - to change files    BYE - to quit
    BROWSE - to scan indexes   CONNECT - to use systems outside Dartmouth


 -> connect dante

                            *** WARNING ***
   You are now trying to access a system at another site.  You are no
longer under the control of the Dartmouth Online System.  Please read
all instructions carefully.
   If at all possible, please exit from the other system with ITS exit
command.  If you still have trouble returning to the Dartmouth Online
System, type LOGOFF to get back.
   If you see a "telnet> " prompt, this means no connection could be
made.  Type "quit" and you will return to the Dartmouth College Library
Online System.

      *** If you are displaying records and you want to Quit, you must first
      *** go back to the Search prompt by typing S, then you may type Q.

Attempting to connect to Dartmouth Dante Project

Please indicate the type of terminal you are using.  Frequently-used types
include vt100 or vt200 (Digital VT100 or VT220 series), tvi925 (Televideo
925), wyse (Wyse 50), and ibmpc (IBM PC or clone).  If you are using either
Darterminal or Macterminal, type vt100.  If you are using a VT220, you may
simply hit return.  If you are not sure of the terminal type, type unknown.

Terminal type: vt100
```

```
        Dartmouth Dante Project

*** BRS/Search for UNIX ***

Initializing ...

Copyright (c) 1991 by BRS Software Products, A Division of Maxwell Online, Inc.
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Revision 6.0  (001-02061-VAXULTRIX-ABX)

Distributed by: BRS Software Products
   Licensed To: Dartmouth College
                Hanover, NH

BRS/Search Full-Text Retrieval System

        Dartmouth Dante Project


   Preparation of this database was made possible in part by a grant from
                 THE NATIONAL ENDOWMENT FOR THE HUMANITIES
                       and through the generosity of

  Dartmouth College, Princeton University, The Dante Society of America,
  La Societ@a Dantesca Italiana, The Mellon Foundation, Apple Computer
         Digital Equipment Corporation, AT&T Foundation and
              The David and Lucile Packard Foundation

   Conceived and directed by Prof. Robert Hollander of Princeton University.

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College.  You may freely reproduce the material on this database in any  form,
as  long  as  it  is  not  for profit or redistribution except as reference in
scholarly works, or in violation of the terms of other  copyrights.   You  may
not  edit  the  material  in  any way without the express consent of the Dante
Project and Dartmouth College.
```

The database currently contains:

"La Commedia"
&
commentaries by the following authors:

Jacopo Alighieri [jacopo], 1322
Jacopo della Lana [lana], 1324
Guido da Pisa [guido], 1327
L'Ottimo commento [ottimo], 1333
Anonimo selmiano [selmiano], 1337
Pietro di Dante [pietro], 1340
Codice Cassinese [cassinese], 1400[?]
Giovanni Boccaccio [boccaccio], 1373
Benvenuto da Imola [benvenuto], 1373
Anonimo fiorentino [fiorentino], 1400
Serravalle, 1416
*Vellutello, 1544
Berthier, 1892
Tozer, 1901
Ruskin, 1903
Torraca, 1905
Grandgent, 1909
Steiner, 1921
Mestica, 1921
Casini-Barbi, 1921
Del Lungo, 1926
Scartazzini-Vandelli [vandelli], 1929
Grabher, 1934

Guiniforto, 1440
Daniello, 1568
Castelvetro, 1570
Venturi, 1732
Lombardi, 1791
Portirelli, 1804
Costa, 1819
Tommaseo, 1837
*Longfellow, 1867
G. di Siena [siena], 1867
Bianchi, 1868
Scartazzini, 1874
Trucchi, 1936
Pietrobono, 1946
Momigliano, 1946
Porena, 1946
Sapegno, 1955
Fallani, 1965
Padoan, 1968
Giacalone, 1968
Singleton, 1970
Bosco-Reggio, 1979
Pasquini-Quaglio, 1982

```
Enter search or option letter (eg Line search, Help, Option list, Quit):

  1_: caesar augustus

Results are:
     CAESAR                                                    189 document(s)
     AUGUSTUS                                                   71 document(s)
  1_: AUGUSTUS OR CAESAR                                       247 document(s)

Enter search or option letter (eg Line search, Help, Option list, Quit):
  2_: caesar and augustus

Results are:
     CAESAR                                                    189 document(s)
     AUGUSTUS                                                   71 document(s)
  2_: AUGUSTUS AND CAESAR                                       13 document(s)

Selections for display are:

    F     to display Full output
    B     to display Brief output
    C     to display terms in Context (hits)
    E     to display specific paragraphs
    O     to Order paragraphs for displaying
    H     to display Help
    S     to Search

Enter your selection [F]: b

==============================================================================

Dartmouth Dante Project

References on query
  2_: AUGUSTUS AND CAESAR                                       13 document(s)

    Doc.#        Reference
    1            Benvenuto   (1373), ^Inf~. 2.22-24
    2            Benvenuto   (1373), ^Inf~. 13.62-69
    3            Benvenuto   (1373), ^Inf~. 34.64-67
    4            Benvenuto   (1373), ^Pur~. 15.130-132
    5            Benvenuto   (1373), ^Par~. 1.28-30
    6            Benvenuto   (1373), ^Par~. 6.94-96
    7            Longfellow  (1867), ^Inf~. 1.70
    8            Longfellow  (1867), ^Pur~. 33.43
    9            Grandgent   (1909), ^Inf~. 1.70
    10           Singleton   (1970), ^Inf~. 34.65
    11           Singleton   (1970), ^Pur~. 7.6
    12           Singleton   (1970), ^Pur~. 29.116
    13           Singleton   (1970), ^Par~. 6.52-96

Enter Doc# to View in Full;  [Search]: 8
```

The Roman numerals making DVX, or Leader. The allusion is to Henry of Luxemburgh, in whom Dante placed his hopes of the restoration of the Imperial power. He was the successor of the German Albert of the preceding note, after an interregnum of one year. He died in 1312, shortly after his coronation in Rome. See Canto VI. Note 97.

Villani, though a Guelf, pays this tribute of respect to his memory, Book IX. Ch. I: "He was wise and just and gracious, valiant in arms, dignified, and catholic; and although of low estate in lineage, he was of a magnanimous heart, feared and redoubted, and if he had lived longer, he would have done great things."

When Henry entered Italy in September, 1310, Dante hastened to meet him, full of faith and hope. Whether this interview took place at Susa, Turin, or Milan, is uncertain; nor is there any record of it, except the allusion in the following extract from a letter of Dante, "written in Tuscany, at the sources of the Arno, on the 14th of May, 1311, in the first year of the happy journey of the divine Henry into Italy." Dante was disappointed that his hero should linger so long in the Lombard towns, and wished him to march at once against Florence, the monster "that drinketh neither of the headlong Po, nor of thy Tyber." In this letter, Mr. Green's Tr., he says: --

> "The inheritance of peace, as the immense love of God witnesseth, was left us, that in the marvellous sweetness thereof our hard warfare might be softened, and by the use thereof we might deserve the joys of our triumphant country. But the hatred of the ancient and implacable enemy, who ever and secretly layeth snares for human prosperity, -- disinheriting some of those who were willing, -- impiously, in the absence of our protector, despoiled us also, who were unwilling. Wherefore we wept long by the rivers of confusion, and incessantly implored the protection of the just king, to scatter the satellites of the cruel tyrant, and restore us to our just rights. And when thou, successor of **Caesar** and of **Augustus**, crossing the chain of the Apennines, brought back the venerable Tarpeian ensigns, our long sighings straightway ceased, the fountains of our tears were stayed, and a new hope of a better age, like a sun suddenly risen, shed its beams over Latium. Then many breaking forth into jubilant vows, sang with Mars the Saturnian reign, and the return of the Virgin.
>
> "But since our sun (whether the fervor of desire suggests it, or the aspect of truth) is already believed to have delayed, or is supposed to be going back in his course, as if a new Joshua or the son of Amos had commanded, we are compelled in our uncertainty to doubt, and to break forth in the words of the Foerunner: 'Art thou he that should come, or look we for another?' And although the fury of long thirst turns into doubt, as is its wont, the things which are certain because they are near, nevertheless we believe and hope in thee, asserting thee to be the minister of God, and the son of the Church, and the promoter of the Roman glory. And I, ...

Locating Related Materials ...

- **Using an online directory**
  Washington University (St. Louis)
- **Performing correlative research on full-text databases**
  Dartmouth College

- **Searching a remote library catalog**
  *University of California - **MELVYL***
- **Finding a book review**
  CARL Systems (Denver)
- **Retrieving the local weather forecast**
  University of Michigan
- **Ordering fax delivery of a journal article**
  University of Maryland

```
You have returned to the Dartmouth College Library Online System.  Type one of the
following commands, or type HELP for more information:
     FIND   - to search for items         SELECT FILE - to search another file
     BROWSE - to scan the indexes  BYE- to end your session
 -> bye

Thank you for using the Dartmouth College Library Online System


Washington University in Saint Louis     Fri Nov  8 10:52 1991

Menu 203: California
     1.    Calif. Agr. Tech. Inst.
     2.    Univ. California Berkeley Library
     3.    California Poly State Univ
     4.    California Research Libraries Information Network
     5.    California State University
     6.    Univ. California and California State Libs
     7.    Occidental Colleges


=================================================================================

                    Welcome to the University of California's

                             MELVYL* LIBRARY SYSTEM


      ------------------------ =>> SYSTEM NEWS <<= ---------------------------
      The PERIODICALS database will be unavailable from 12:01 to 10:00 am on
          Sunday, Nov. 10 while it is being sorted.  Type SHOW DLA6 NEWS.
      -----------------------------------------------------------------------


(c)1984. *Registered trademark of The Regents of the University of California.
==============================================================================
OPTIONS:  Choose an option, or type any command to enter the CATALOG database.

     HELP        - For help in getting started.

     [return]    - Press RETURN to choose a database for searching.

     START <db>  - Type START <database name> to begin searching in a database.

->
=================================================================================

     Type...     for one of the following choices:

      PA         Personal Author search
      SU         Subject search
      TI         Title search
      HELP       More information on choices
      END        End your session.
```

```
TEN-> su

Type SUBJECT heading words,  or type HELP,  then press RETURN.

TEN-> caesar augustus

   Command being processed: FIND SU CAESAR AUGUSTUS

Search request: FIND SU CAESAR AUGUSTUS
Search result:  41 records in the TEN-YEAR Catalog database

1. DISSERTATION
   Albert, Rainer.
     Das Bild des Augustus auf den fruhen Reichspragungen : Studien zur
   Vergottlichung des ersten Prinzeps / von Rainer Albert.  Speyer :
   Numismatische Gesellschaft Speyer, 1981.
     Series title:  Schriftenreihe der Numismatischen Gesellschaft Speyer e.V.
   ; Bd. 21.
       UCLA  URL        CJ 1001 A42 1981
       UCSB  Library    DG279 .A63 1981



-------------------------------------------------------------------------------
Type choice,  or type HELP for help, END to end session:
   NS  - Next screen of Short display       PA - New Personal Author search
   SHO - Different records in Short         SU - New Subject search
   LON - Long display                       TI - New Title search
   REV - Review display
TEN-> lon

Type the numbers of the records you want to see in a LONG display, or
type HELP.
```

```
Search result:  41 records in the TEN-YEAR Catalog database

1. DISSERTATION

Author:         Albert, Rainer.
Title:          Das Bild des Augustus auf den fruhen Reichspragungen : Studien
                  zur Vergottlichung des ersten Prinzeps / von Rainer Albert.
                  Speyer : Numismatische Gesellschaft Speyer, 1981.
Description:    248 p. : ill. ; 21 cm.

Series:         Schriftenreihe der Numismatischen Gesellschaft Speyer ; Bd. 21.

Notes:          Thesis (doctoral)--Universitat Mannheim, 1980.
                Bibliography: p. 7-20.

Subjects:       Augustus, Emperor of Rome, 63 B.C.-14 A.D.
                Emperor worship, Roman.
                Numismatics, Roman.

Other entries: Schriftenreihe der Numismatischen Gesellschaft Speyer e.V. ; Bd.
                  21.

Call numbers:  UCLA  URL       CJ 1001 A42 1981
               UCSB  Library   DG279 .A63 1981

--------------------------------------------------------------------------------
```

Checking a Source ...

- **Using an online directory**
  Washington University (St. Louis)
- **Performing correlative research on full-text databases**
  Dartmouth College
- **Searching a remote library catalog**
  University of California

- **Finding a book review**
  CARL Systems (Denver) - ***Choice Book Reviews***
- **Retrieving the local weather forecast**
  University of Michigan
- **Ordering fax delivery of a journal article**
  University of Maryland

```
                    >>>  Systems That Inform  <<<

                       Welcome to the CARL System
                             (Release 83)


             A Computerized Network of Systems and Services




          Developed by the Colorado Alliance of Research Libraries
              Marketed and supported by CARL Systems, Inc.

                        777 Grant St.,Suite 306
                          Denver, Co. 80203
                          Voice:    303-861-5319
                            Fax:    303-830-0103
                       Internet:    help@carl.org

==============================================================================

      CARL offers access to the following groups of databases:


             1. Library Catalogs
                    (including Government Publications)

             2. Current Article Indexes and Access
                    (including UnCover and ERIC)

             3. Information Databases
                    (including Encyclopedia)

             4. Other Library Systems

             5. Library and System News

     >>> UnCover2 (Article Delivery) now available with UnCover  <<<

            See the General PAC News for more information,
            or enter number 50 for delivery details.

  Enter the NUMBER of your choice, and press the <RETURN> key >>3
  1. Libraries   2. Articles   3. Information  4. Other Systems  5. News

                     INFORMATION DATABASES

                     60. Choice Book Reviews

                     61. Encyclopedia

                     62. Environmental Education

                     63. Metro Denver Facts

                     64. School Model Programs

                     65. Internet Resource Guide

                     66. Department of Energy

=============================================================================

   Enter the NUMBER of your choice, and press the <RETURN> key >>60

 10:17 A.M.       SELECTED DATABASE:  Choice Book Reviews


 Welcome to CHOICE : Current Reviews for College Libraries.

 The file includes reviews from September 1988 forward, supplied by the Association of
 College  and  Research  Libraries.  Data  are  copyright  ACRL,  and  CARL  thanks  the
 Association for allowing us to use its records.

     Enter        N   for  NAME search
                  W   for  WORD search
                  B   to   BROWSE by title
                  S   to   STOP or SWITCH to another database

     Type the letter for the kind of search you want,
     and end each line you type by pressing <RETURN>

     SELECTED DATABASE:  Choice Book Reviews

ENTER  COMMAND (? FOR HELP) >>  n

>robert pirsig

ROBERT 01270 NAMES
ROBERT + PIRSIG 00001

Pirsig, robert m                                                   00001 ITEMS
  1 Steele thomas j                                                      1990
     Guidebook to zen and the art of motorcycle maint

Enter <LINE NUMBER> to display full record, or <Q>UIT for new search
```

--Choice Book Reviews------------------

AUTHOR(s): DiSanto, Ronald L.
Steele, Thomas J.
TITLE(s): Guidebook to Zen and the art of motorcycle maintenance
by Ronald L. DiSanto and Thomas J. Steele
407 pages
Pub. date: 1990
Pub. name: W. Morrow
$22.95
$12.95
ISBN: 0-688-08461-3
ISBN: 0-688-06069-2
Reviewed in: Choice, vol. 28 no.6
1991feb

Review: DiSanto and Steele have produced a valuable study guide to Robert Pirsig's psychological-philosophical novel Zen and the Art of Motorcycle Maintenance (CH, Jul'74). The first half of this thick guidebook consists chiefly of "A Philosophical Backpack": chapters devoted to Eastern and Western philosophy, which most readers will find intellectually demanding and rhetorically annoying. DiSanto, the author of these chapters, has brilliantly summarized and compared a host of relevant major philosophical positions but has marred his analyses with scores of unintentionally condescending questions and suggestions--e.g., "What do you think?" and "Perhaps you might be interested in developing that analogy." Besides a chronology and map of the novel's journey, this guide further includes previously unpublished sections of Pirsig's manuscript, a lengthy letter from Pirsig to Robert Redford (who was then considering filming the book), nearly 100 pages of reprinted book reviews and scholarly articles, and an annotated bibliography, as well as page-by-page notes and an index to the novel. Although some of its remarks (including a number in the notes) are more ingenious than plausible, this volume is helpful and informative and will make Pirsig's book more accessible to all who read it.

Reviewer: Eastwood, David R.
Reviewer affil: United States Merchant Marine Academy

Subjects: Pirsig, Robert M.
Includes: index
Choice review # 28-3248
LC Card Number: 90-37374

Knowing What Clothes to Pack ...

- **Using an online directory**
  Washington University (St. Louis)
- **Performing correlative research on full-text databases**
  Dartmouth College
- **Searching a remote library catalog**
  University of California
- **Finding a book review**
  CARL Systems (Denver)
- **Retrieving the local weather forecast**
  *University of Michigan - **National Weather Service***
- **Ordering fax delivery of a journal article**
  University of Maryland

```
Washington University in Saint Louis          Fri Nov  8 11:24 1991

Menu 400: Government Libraries and Public Accessible Databases

     1. Library of Congress Cataloging
     2. NASA online database
     3. Science and Technology Information System
     4. Compuserve Internet Access
     5. Weather Forecast for US/Canada

Go To: 5


     * * * * * * * * * * * * * * * * * * * * * * * *
     *                                             *
     *            University of Michigan           *
     *              WEATHER UNDERGROUND            *
     *                                             *
     *             College of Engineering          *
     *    Atmospheric, Oceanic, & Space Sciences   *
     *                                             *
     *     comments: sdm@madlab.sprl.umich.edu     *
     * * * * * * * * * * * * * * * * * * * * * * * *

                WEATHER UNDERGROUND MAIN MENU
             -------------------------------------
               1) Forecast for a U.S. city
               2) National Weather Summary
               3) Current weather observations
               4) Ski conditions
               5) Long-range forecasts
               6) Latest earthquake report
               7) Severe weather
               8) Hurricane advisories
               9) Canadian forecasts
               X) Exit program
               C) Change scrolling to screen
```

DC AND VICINITY FORECAST
NATIONAL WEATHER SERVICE WASHINGTON D.C.
1000 PM EDT MON SEP 21 1992

TONIGHT...MOSTLY CLOUDY AND MILD WITH A 30 PERCENT CHANCE OF SHOWERS. LOWS IN THE LOWER 70S. SOUTHEAST WINDS 5 TO 10 MPH.
TUESDAY...MORNING CLOUDINESS...THEN PARTLY CLOUDY VERY WARM AND HUMID WITH A 60 PERCENT OF SHOWERS AND THUNDERSTORMS. THESE THUNDERSTORMS MAY CONTAIN GUSTY WINDS AND HEAVY DOWNPOURS. HIGHS IN THE MID 80S. SOUTH WINDS INCREASING TO 15 TO 20 MPH.
TUESDAY NIGHT...MOSTLY CLOUDY WITH A 50 PERCENT CHANCE OF SHOWERS AND THUNDERSTORMS. LOWS IN THE UPPER 50S TO LOWER 60S. WINDS SHIFTING TO THE NORTHWEST AT 20 TO 25 MPH AND GUSTY.
WEDNESDAY...MOSTLY SUNNY BREEZY AND COOL. HIGHS IN THE MID TO UPPER 60S.

TODAYS HIGH TEMPERATURE 79
LOW TEMPERATURE 66

****
Special weather statement in effect for WBC
****

SPECIAL WEATHER STATMENT
NATIONAL WEATHER SERVICE WASHINGTON DC
515 PM EDT TUE SEP 22 1992

..SEVERE THUNDERSTORM WATCH IN EFFECT FOR CENTRAL MARYLAND AND EXTREME NORTHERN VIRGINIA UNTIL 1000 PM...

AT 510 PM NATIONAL WEATHER SERVICE RADAR WAS SHOWING A LINE OF THUNDERSTORMS EXTENDING WESTERN WASHINGTON COUNTY MD SOUTHWEST ACROSS JEFFERSON COUNTY IN WEST VIRGINIA INTO FREDERICK AND SHENANDOAH COUNTIES IN VIRGINIA. THE SHOWERS AND THUNDERSTORMS WERE MOVING TO THE NORTHEAST AT 35 MPH.

THE STONGEST THUNDERSTORMS WERE LOCATED ALONG A LINE FROM NEAR HAGERSTOWM MD TO JUST EAST OF MARTINSBURG WV. WIND GUSTS OF 35 TO 45 MPH AND HEAVY RAINS HAVE BEEN REPORTED WITH THESE STORMS. THIS LINE OF STRONGER THUNDERSTORMS WILL BE MOVING INTO FREDERICK COUNTY MD...AND THE WESTERN SECTIONS OF LOUDOUN AND FAUQUIER COUNTIES IN VIRGINIA WITHIN THE HOUR. PERSONS IN THESES AREAS SHOULD BE ALERT FOR RAPIDLY CHANGING WEATHER CONDITIONS AND THE POSSIBILITY OF SEVERE WEATHER.

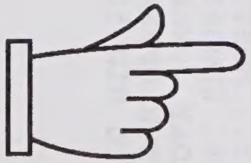
THE NATIONAL WEATHER SERVICE WILL MONITOR THIS SITUATION CLOSELY AND ISSUE FURTHER STATEMENTS AS NEEDED. STAY TUNED TO NOAA WEATHER RADIO FOR THE LATEST UPDATES.

EXTENDED FORECAST FOR MARYLAND...DELAWARE AND THE EASTERN PANHANDLE OF WEST VIRGINIA
NATIONAL WEATHER SERVICE WASHINGTON D.C.
330 PM EDT TUE SEP 22 1992

FRIDAY THROUGH SUNDAY
FRIDAY...MOSTLY SUNNY AND COOL. SATURDAY AND SATURDAY NIGHT...MOSTLY CLOUDY. SUNDAY...PARTLY CLOUDY. DAYTIME HIGHS IN THE 60S FRIDAY AND SATURDAY...WARMING INTO THE LOWER 70S SUNDAY. OVERNIGHT LOWS RANGING FROM THE UPPER 30S WEST TO NEAR 50 EAST THURSDAY NIGHT...THE MID 40S WEST TO MID 50S EAST FRIDAY NIGHT...MODERATING INTO THE 50S SATURDAY NIGHT.

When You Need It Now ...

- **Using an online directory**
  Washington University (St. Louis)
- **Performing correlative research on full-text databases**
  Dartmouth College
- **Searching a remote library catalog**
  University of California
- **Finding a book review**
  CARL Systems (Denver)
- **Retrieving the local weather forecast**
  University of Michigan



- **Ordering fax delivery of a journal article**
  University of Maryland - ***UnCover2 thru VICTOR***

```
                              Welcome to

                                VICTOR

                       The Online Library Catalog

                                of the

                       University of Maryland System



         Developed by the Colorado Alliance of Research Libraries
              Marketed and supported by CARL Systems, Inc.
                           Denver, Colorado


 Press <RETURN> to start session:  (Remember, type //Exit when finished )>>

==============================================================================

                                V I C T O R

        The Online Library Catalog of the University of Maryland System
    ------------------ Library Catalogs of the UMS Campuses ------------------

            Available Now                          Forthcoming

     1. Univ. of Maryland System (UMS)     7. Bowie State University (BSU)
     2. UM Law Library (UMLL)              8. Center for Environmental and
     3. UM Baltimore County (UMBC)            Estuarine Studies (CEES)
     4. UM College Park (UMCP)             9. Coppin State College (CSC)
     5. UM Eastern Shore (UMES)           10. Frostburg State University (FSU)
     6. UM University College (UMUC)      11. Salisbury State University (SSU)
                                          12. Towson State University (TSU)
    14. U Baltimore Law Library (UBLL)    13. U Baltimore (UB)
    ----------------------------------------------------------------------
                      15. Library & System News
    Other Databases                      ************************************
    16. UnCover (Article Access)         * This is a revised version of the *
    17. The CARL System (Colorado)       * new library catalog;             *
    18. Other Library Systems            * Expect continuing enhancements   *
                                         ************************************
    Enter the NUMBER of your choice, and press the <RETURN> key >>16
```

```
10:46 A.M.         SELECTED DATABASE:  UnCover

                          Welcome to
                       UnCover and UnCover2
           The Article Access and Delivery Solutions from CARL.

UnCover contains records describing journals and their contents. It
includes more than 10,000 titles, and almost 2,000,000 articles.
Over 600,000 articles are added annually.

UnCover2 is a new service which offers you the opportunity to order
any article in this data base. Type ? for order details.

     Enter N  for  NAME search
           W  for  WORD search
           B  to   BROWSE by journal title
           S  to   STOP or SWITCH to another database
            Type the letter for the kind of search you want,
            and end each line you type by pressing <RETURN>

                    SELECTED DATABASE:  UnCover

ENTER  COMMAND (use  //EXIT  to return HOME.....)>> w
```

```
=====================================================================================

    REMEMBER -- WORDS can be words from the title, or from subtitles, summaries or
    abstracts that appear on the Table of Contents page for each journal.

    A WORD search will also often return NAMES of people who are discussed or referred
    to in the articles.

    You may also supply the name of a journal in your search in order to limit your
    results to that publication.

    for example HEALTH CARE TRENDS
                MICKEY MANTLE
                AIDS SCIENTIFIC AMERICAN

    Enter word or words (no more than one line, please) separated by spaces and press
    <RETURN>.>

    Internet

    WORKING...
    1  INTERNET
      00060 ITEMS
```

```
  1                                                          CU  DUW DULAW
     Human Rights Internet reporter
 ...

 22 Arms, Caroline R.                                  (Online.  09/01/90)
     Using the National Networks: BITNET And the Internet...
 ...

 59 Lynch, Clifford                          (Library hi tech.  1989    )
     Linking Library Automation Systems to the Internet:

==========================================================================

-------------------------------------------------------UnCover--------------------
AUTHOR(s):              Lynch, Clifford
TITLE(s):               Linking Library Automation Systems to the Internet:
                        Functional Requirements, Planning, and Policy Issues.
Summary:                Network access was not a major consideration in the design or
                        selection of most current library automation systems.  But when
                        library systems are attached to the network as an afterthought,
                        they often display unsatisfactory functional characteristics.
                        Libraries now face the realities of the wired campus environment
                        and the collision between library automation tradition and the
                        new world of networks.

           In:   Library hi tech.
                 1989 v 7 n 4
           Page: 7

OWNERS:    AUR CU  DPL DU  UNC UW

ISSUE STATUS: Published
---59 of 60------------------------------------------UnCover--------------------
<RETURN> to continue, <Q>UIT for a new search, or <R>EPEAT this display
<H> for HISTORY  <D> for DELIVERY INFORMATION  ? for HELP >d
```

```
This article may be available at your library or through interlibrary loan.

The full text of this article is available by FAX.

The cost is:                    $  6.50  (service fee)
                 plus           $  3.00C (copyright fee)
                 for a TOTAL of:  $  9.50

(The copyright fee is set by and paid to the publisher.)

If you would like a FAX copy of the article, please
enter a MASTERCARD or VISA number, or Special Account ID,
? for more information, or <RETURN> to exit >>>

Please enter password >

Enter your name: (eg JOHN Q. DOE) > Ron Larsen

Enter a daytime VOICE PHONE number: (include area code) > 301-405-9194

Please enter the FAX PHONE number of your FAX machine --
(Include dialing prefix '1', or '1' plus AREA CODE
if not in Denver local calling area)

Type ? for more information, or <Q> to cancel.

Enter FAX PHONE NUMBER >> 1-301-314-9865

Please enter local routing information for FAX delivery (optional) --
eg. department number, room number, etc (up to 20 characters)

Enter information, and touch <RETURN> to continue
>> McKeldin Library, ITD

You have requested a FAX copy of

Using the National Networks: BITNET And the Intern  Arms, Caroline R.

to 1301-314-9865         MCKELDIN LIBRARY, ITD

Charged to

O.K. to proceed? (Y or N -- ? for Help)y
Thank you -- now writing your order...
Thank you. Your reference # is: 91312105005
Please note this number for use if you need to contact CARL Systems.
Press <RETURN> to continue...
```

National Library Resources ...

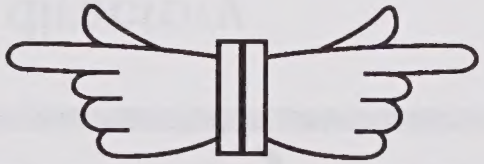
- **Using an online directory**
  Washington University (St. Louis)
- **Performing correlative research on full-text databases**
  Dartmouth College
- **Searching a remote library catalog**
  University of California
- **Finding a book review**
  CARL Systems (Denver)
- **Retrieving the local weather forecast**
  University of Michigan
- **Ordering fax delivery of a journal article**
  University of Maryland

... at Your Fingertips

The End ...

There is no end ...

... this is only the beginning!



THE MERIT NETWORKING SEMINARS

Gigabit Technology Update

Phill Gross
Vice President, Network Technology
Advanced Network & Services, Inc.
Chairman, Internet Engineering Task Force
Member, Internet Activities Board

BIOGRAPHICAL NOTES

Phillip Gross
Vice President for Network Technology
Advanced Network & Services, Inc.

Phill Gross joined Advanced Network & Services in May 1991 as Vice President for Network Technology. His principal area of responsibility is developing new protocol technology for the ANS backbone network. He is currently planning the ANS upgrade to broadband technology.

Prior to ANS, Mr. Gross was at the Corporation for National Research Initiatives. At CNRI, Mr. Gross organized and chaired the Federal Engineering Planning Group (FEPG) of the U.S. Federal Networking Council. The FEPG is responsible for engineering joint-agency and international network connections. He also organized and chaired the Intercontinental Engineering Planning Group (IEPG) of the Coordinating Committee for Intercontinental Research Networks (CCIRN). Prior to joining NRI, he was at MITRE Corporation where he developed a joint-agency program in networking performance research. At MITRE, he also led an effort to plan the integration of OSI protocols into Department of Defense networks. Prior to MITRE, Mr. Gross worked for Dr. David Mills at Linkabit on protocol performance activities.

In 1986, Phill Gross was a founding member of the Internet Engineering Task Force (IETF) of the Internet Activities Board (IAB). The IETF is the engineering arm of the IAB, with responsibility for evolution of the TCP/IP protocol family and for making Internet standards recommendations to the IAB. He has served as IETF Chair and IAB member since July 1987.

Mr. Gross has a masters degree in computer science from the Pennsylvania State University.

THE MERIT NETWORKING SEMINARS

Use of Online Information by Library Patrons and Librarians

Karen Drabenstott
Associate Professor
School of Information and Library Studies
University of Michigan

BIOGRAPHICAL NOTES

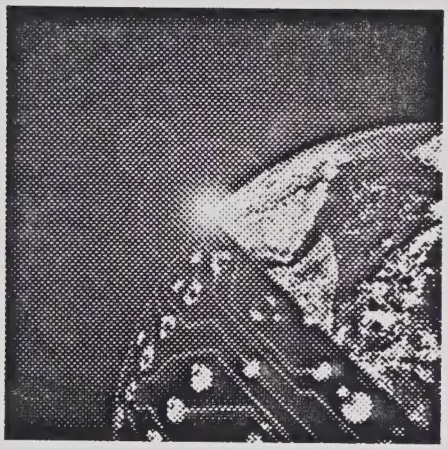
Karen Markey Drabenstott
Associate Professor
School of Information and Library Studies
University of Michigan

Karen M. Drabenstott has conducted research in online database coverage, overlap, and redesign; patron use and searching of online databases; subject access to augmented MARC records; and descriptions of subject contents of visual materials. The latter research was published by Greenwood Press in her monograph entitled "Subject access to visual resources collections."

In 1982-3, Karen was project manager of the Online Catalog Project which was a nationwide Council on Library Resources-sponsored (CLR) study of patron use of 17 different online catalogs in 29 libraries. She published the findings of this nationwide study in "Subject searching in library catalogs." As principal investigator of the CLR-sponsored Dewey Decimal Classification (DDC) Online Project in 1984-5, she demonstrated that the DDC enhanced subject access and subject searching strategies in online catalogs and the display of subject information in bibliographic records. From 1987-9, CLR funded her study of the machine-readable Library of Congress Subject Headings (LCSH) and findings are given in the forthcoming book entitled "Using Subject Headings for Online Retrieval: Theory, Practice, and Potential." The LCSH project also served as the impetus for research projects sponsored by the Department of Education and the Online Computer Library Center (OCLC) on testing a new subject access design in which search trees control system responses and determine appropriate subject searching approaches to the subject queries users enter into online catalogs. This project will be the focus of her talk at the MERIT Conference.

Karen joined the faculty of the University of Michigan in January 1987. From 1981 to 1986, she was a research scientist in the Office of Research at OCLC. She received her B.A. from The Johns Hopkins University and her M.L.S. and Ph.D. from the School of Information Studies at Syracuse University.

THE MERIT NETWORKING SEMINARS



Weather Underground

Jeff Masters
Creator of UM Weather Underground
University of Michigan

BIOGRAPHICAL NOTES

Jeffrey Mason Masters
Creator, U-M Weather Underground
University of Michigan

Jeff Masters is a Ph.D. candidate in Atmospheric Science at the University of Michigan, specializing in air pollution research. He earned both his B.S. and M.S. degrees in Atmospheric Science from the University of Michigan in 1982 and 1983. After graduating, he taught weather forecasting at Brockport State College in New York for one year, then moved to Miami, Florida to take a position as a research meteorologist for the National Oceanic and Atmospheric Administration (NOAA). His work at NOAA involved flying on their research aircraft, including many flights into hurricanes. You can see him at work, flying into Hurricane Gilbert in 1988, on the hurricane episode of the PBS television series, "NOVA."

After four years of flying into hurricanes and severe storms all across the world, Jeff opted to return to the much safer world of graduate school. He hopes to pursue a career in research and education, and plans to continue writing software to bring weather information to users of the Internet.

The University of Michigan

Weather Underground

Abstract

A prototype interactive weather display system has been developed which allows across-campus access to domestic and international weather and climate information. The RS 6000/320H provided by IBM is used in a distributed computing environment to construct a wide range of animated weather maps, satellite images, forecast information and climatological data. The system allows networked X-window users to access user-specified graphical weather information in real-time for most of North America. The system will be expanded to allow distribution of textual and graphical information to secondary school earth science teachers across the State of Michigan as well as within the University of Michigan.

Contributors:

Perry J. Samson
Jeffrey Masters
Peter Sousounis

Department of Atmospheric,
Oceanic and Space Sciences
University of Michigan
Ann Arbor
Michigan 48109-2143

samson@madlab.sprl.umich.edu

Distributed Weather Computing

Weather information, perhaps as much as any data stream used in science today requires the ability to ingest and manipulate huge amounts of information on the fly. The scientific and engineering community is challenged by the need to provide better ways to assimilate the vast amount of weather and climate data becoming available. The Weather Underground provides a link between the University of Michigan (UOM) Department of Atmospheric, Oceanic, and Space Sciences (AOSS) and both the university community and the teachers and students of secondary education in the State of Michigan. The purpose of that link is the creation of a range of computer services which will provide distributed interactive access to current weather and climate change information. This project takes advantage of a unique computer

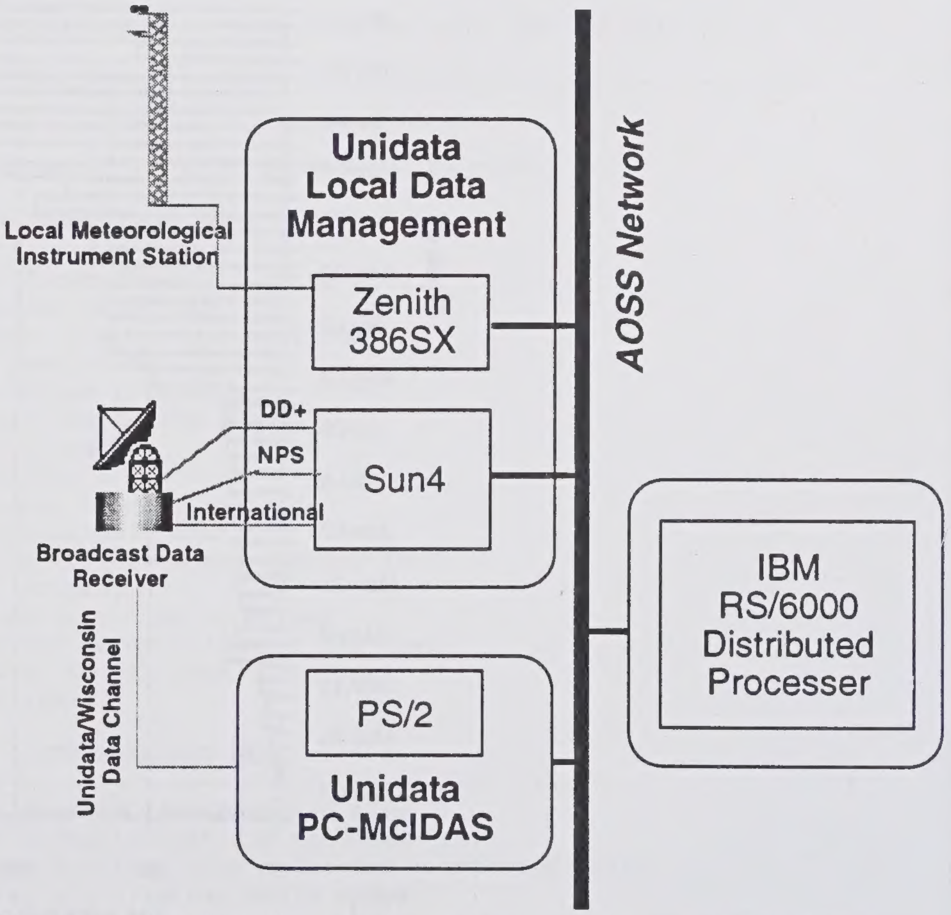

Local Meteorological Instrument Station
Unidata Local Data Management
Zenith 386SX
AOSS Network
DD+
NPS
International
Sun4
Broadcast Data Receiver
Unidata/Wisconsin Data Channel
IBM RS/6000 Distributed Processer
PS/2
Unidata PC-McIDAS

Figure 1. Distributed computer system used to ingest real-time weather data from international, national and local sources.

network capacity within the State of Michigan, named MichNet, which provides local phone ports in virtually every major city in the state. The project also makes use of the resources available to the university community via the University Corporation for Atmospheric Research (UCAR) UNIDATA program. The combination of intrastate computer access plus the university's real-time weather data management system provides the University of Michigan with access to a range of state-of-the-art interactive weather information system.

Accessing UM-weather

UM-WEATHER can be accessed from the MichNet prompt by typing um-weather as follows:

```
Which Host? um-weather
```

From network connections it can be accessed directly by issuing the telnet command:

```
telnet downwind.sprl.umich.edu 3000
```

UM-Weather

One goal of this project was to make available real-time weather information in both textual form for users such as K-12 education where computer network availability is generally not great. A program, named UM-WEATHER, has been written in *c* to extract textual information

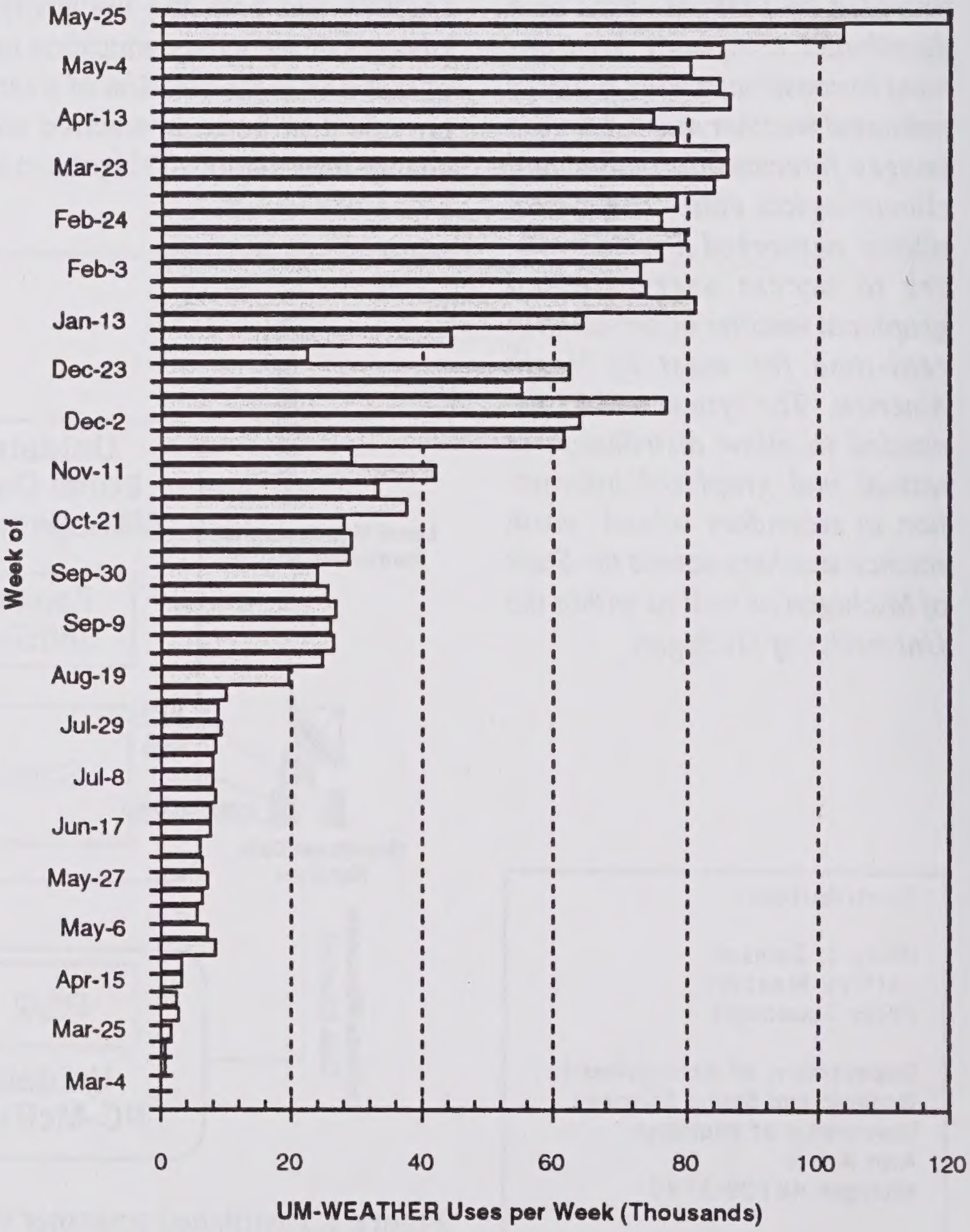


Figure 2 UM-WEATHER use per week through May 25, 1992.

from the incoming data stream and make it available in menu form.

The UM-WEATHER program has proven to be widely used as a means for demonstrating the usefulness of network access to schools within the State of Michigan. Moreover its use now is national and even international and represents a unique resource available for educational purposes.

Example UM-WEATHER Session: Initial Menus

```
telnet downwind.sprl.umich.edu 3000


------------------------------------------------------------------------------
*                           University of Michigan                           *
*                             WEATHER UNDERGROUND                            *
------------------------------------------------------------------------------
*                                                                            *
*                   College of Engineering, University of Michigan          *
*                   Ann Arbor, Michigan  48109-2143                          *
*                   comments: sdm@madlab.sprl.umich.edu                      *
*                                                                            *
*   With Help from: The UNIDATA Project,                                     *
*                   University Corporation for Atmospheric Research          *
*                   Boulder, Colorado  80307-3000                            *
*                                                                            *
*   Data Source:  · Zephyr Weather Information Service (508-898-3511)        *
------------------------------------------------------------------------------
*   NOTE:----------> New users, please select option "H" on the main menu:  *
*                   H) Help and information for new users                    *
*                                                                            *
*        NEW FEATURE: Marine forecasts and observations! (option #11)        *
*                                                                            *
------------------------------------------------------------------------------


Press Return for menu, or enter 3 letter forecast city code:

                 WEATHER UNDERGROUND MAIN MENU
                ******************************
                 1) U.S. forecasts and climate data
                 2) Canadian forecasts
                 3) Current weather observations
                 4) Ski conditions
                 5) Long-range forecasts
                 6) Latest earthquake report
                 7) Severe weather
                 8) Hurricane advisories
                 9) National Weather Summary
                10) International data
                11) Marine forecasts and observations
                 X) Exit program
                 C) Change scrolling to screen
                 H) Help and information for new users
                 ?) Answers to all your questions
                   Selection:1

                        CITY FORECAST MENU
                ---------------------------------------------------
                1) Print forecast for selected city
                2) Print climatic data for selected city
                3) Display 3-letter city codes for a selected state
                4) Display all 2-letter state codes
```

The use of UM-WEATHER has grown steadily to well over 100,000 uses a week. It has become a vital part of our introductory undergraduate courses on weather and climate.

Graphics Products

In addition to the textual information available via UM-WEATHER the distributed weather data system which has been created as part of the WEATHER UNDERGROUND is preparing to make available graphical products to a wide variety of computer environments. Selected weather images, including weather maps, satellite images, radar images and animated loops are prepared and distributed using crontabs on the IBM RS 6000.

The images produced are then made available for use by interactive programs being developed for UNIX, DOS, and MacOS platforms. The images are even made available in a form that popular screen-saver programs can use the current weather and satellite images in an automatically updated slide show format.

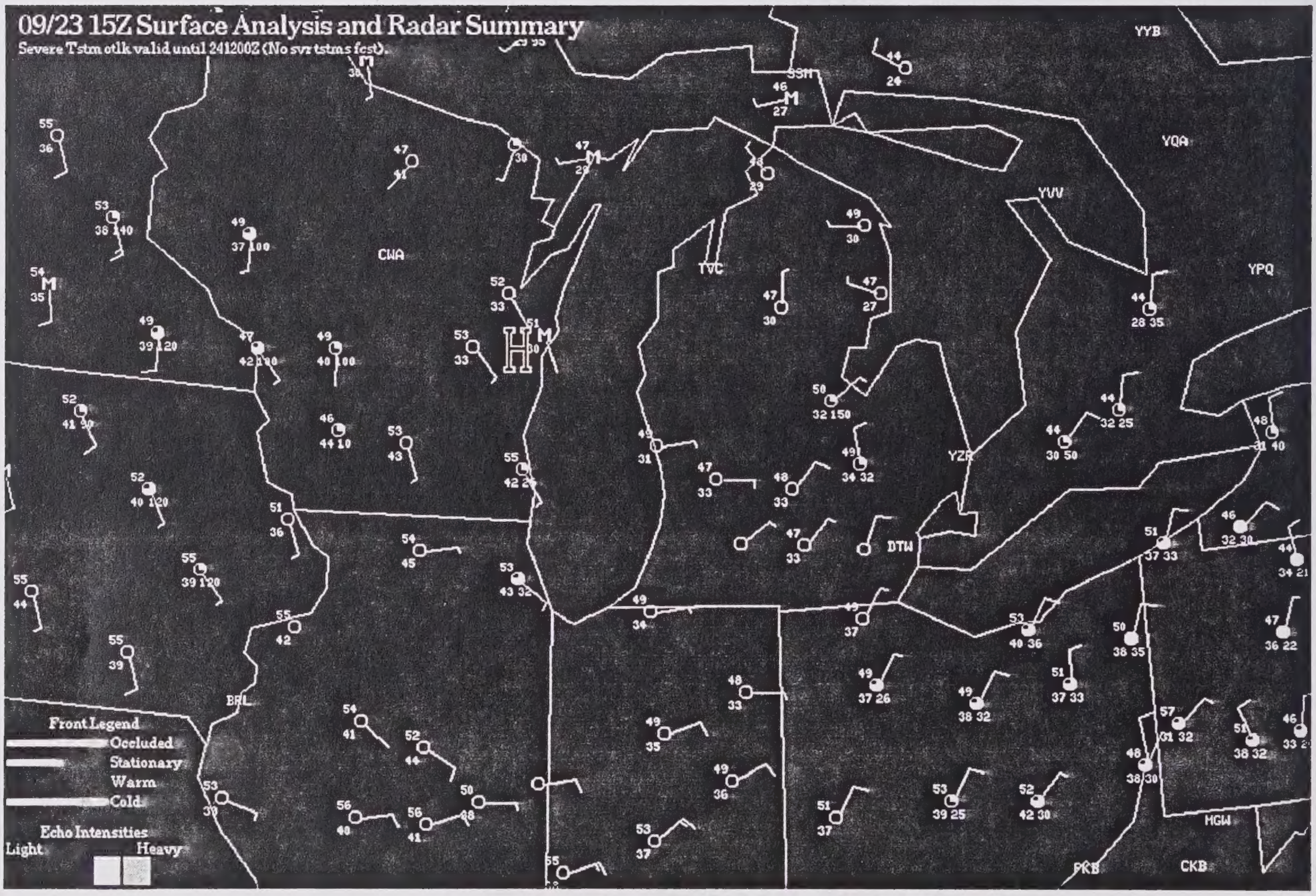
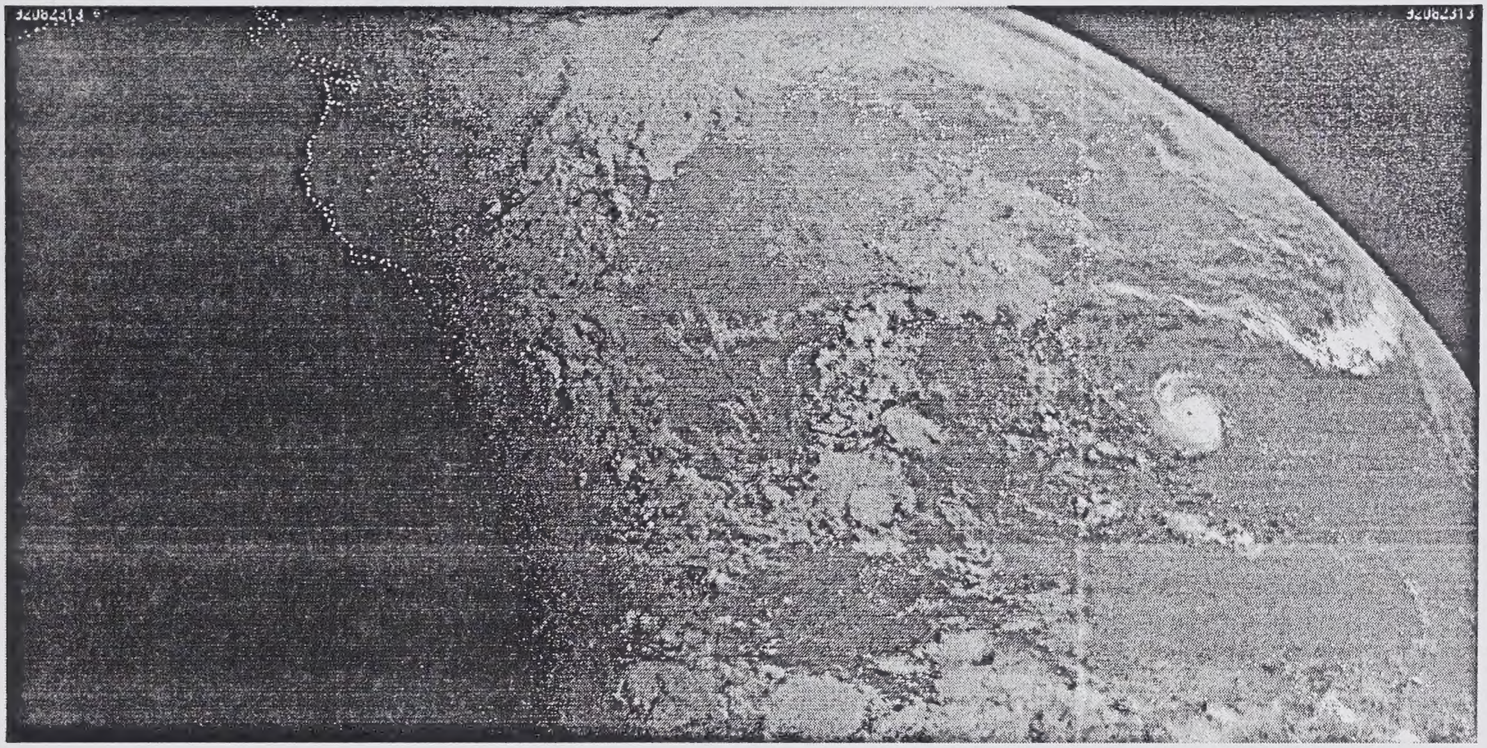

09/23 15Z Surface Analysis and Radar Summary
Severe Tstm otlk valid until 241200Z (No svr tstms fcst).
YYB
SSM
YQA
YVV
CWA
TVC
YPQ
YZR
DTW
BRL
HGW
CKB
PKB
Front Legend
Occluded
Stationary
Warm
Cold
Echo Intensities
Light
Heavy

Figure 3. Surface weather map of the midwestern United States. Users will have interactive ability to choose region of interest and parameters to be shown.

August 23, 1992: 11:00 a.m. EDT



August 23, 1992: 5:00 p.m. EDT

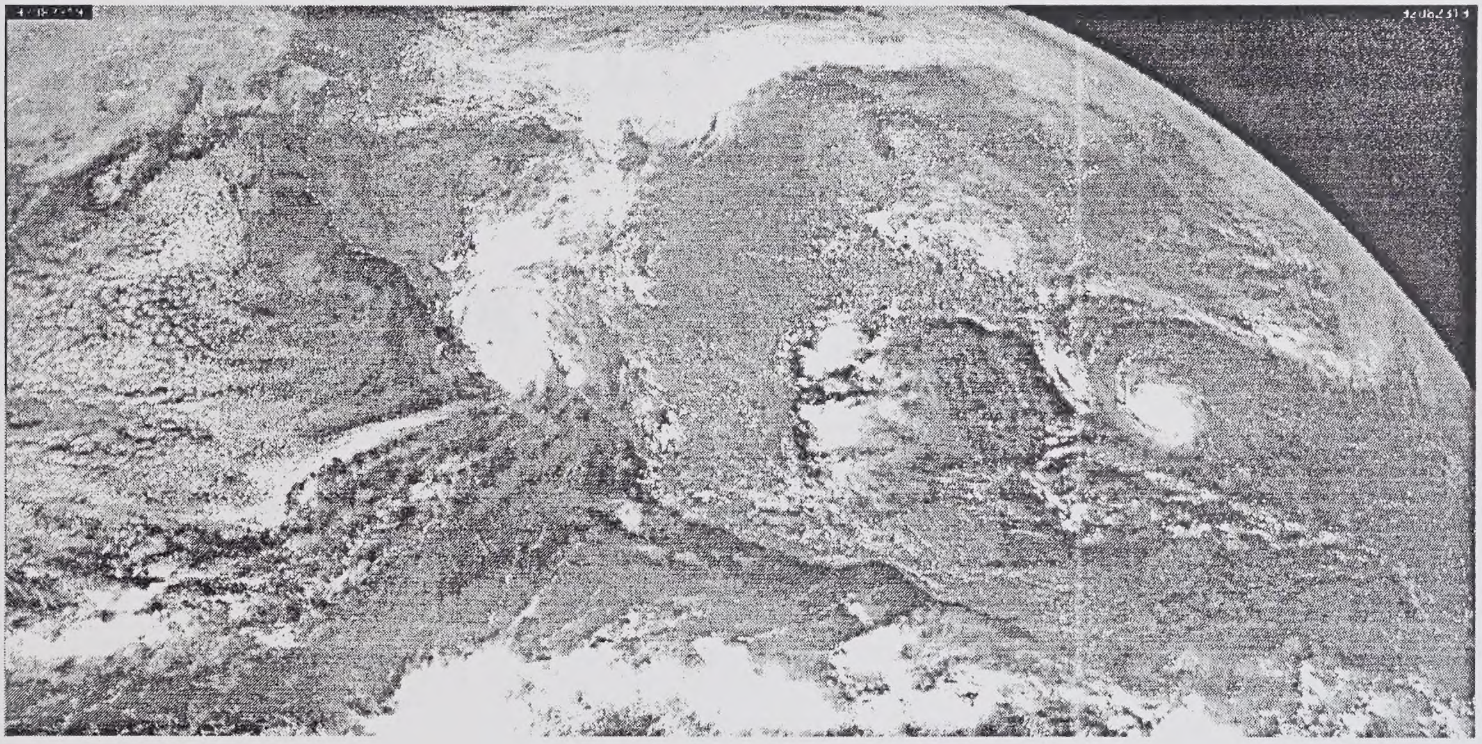
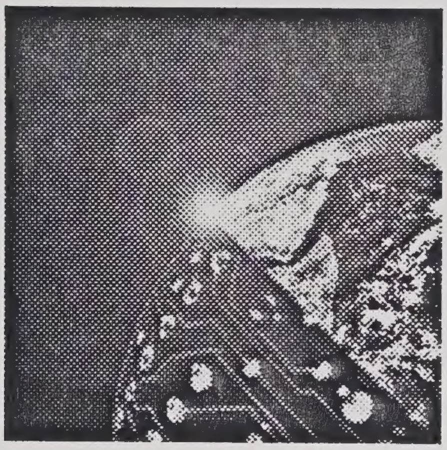


Figure 4. Visibile image of Hurricane Andrew obtained using the WEATHER UNDERGROUND system.

THE MERIT NETWORKING SEMINARS



Commercial Aspects of the Internet

John Duhring
WAIS Project

Commercial Aspects of the Internet

[illegible]
[illegible]

BIOGRAPHICAL NOTES

John Duhring
WAIS, Inc.

John Duhring entered the book publishing business when books about computers were taking off. Responsible for acquiring manuscripts for Prentice-Hall, he learned about micro-computers and their potential use in publishing directly from authors, visionaries, and educators.

After pioneering the development of "electronic manuscripts" and book/software packages in New York, in 1982 John was asked by Apple Computer to become their "Publishing Evangelist", encouraging publishers to use new desktop methods for creating traditional, paper-based products.

Eager to put the new tools to use and to exercise his publishing skills, John helped launch several ventures including Singular Software, whose Interlace database is now published by Borland as Reflex for the Macintosh, and Supermac Software, whose DiskFit, SuperLaserSpool, and PixelPaint became best-sellers.

John Duhring sees the most promising new use of computers in the integration of computers and networks. As a founding member of WAIS, Inc., he is helping clients develop electronic publishing businesses that turn the micro-computer into an information delivery vehicle as well as a personal productivity tool.

Commercial Use of the Internet

Integrated access to people and information

John Duhring
Director of Business Development
Wide Area Information Servers Inc.

Beyond the In–house LAN

Mail → **Not everyone I work with is in–house. How can I reach them?**

File Transfers → **How do I get the stuff I need, when I don't know where it is?**

Database Access → **I'm not trained at running a mainframe, but I need information**

Information and Value

Information dynamics

- It comes to you automatically (e-mail and news)
- You go get it when you need it
- You publish it so others can use it

The Transaction Value of Information

- Information approaches the value of the transaction itself

Corporate Channel Systems

Frito–Lay

- Just–in–time inventory
- Accurate tracking of marketing and promotions

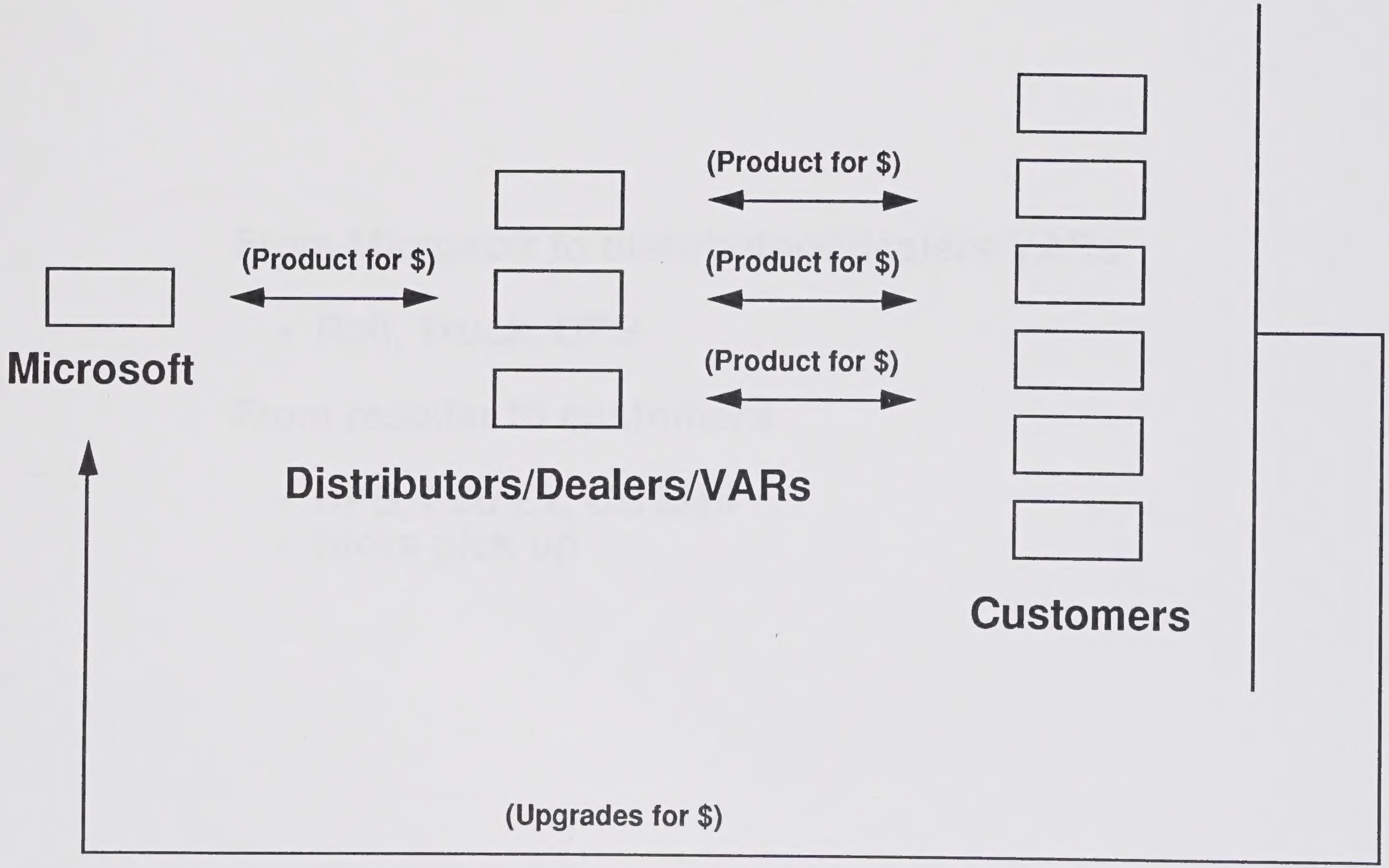
Mrs. Field's Cookies

- Low overhead at each store
- Quick response to new products and recipes

American Airlines

- Survival in chaos

Product Channels



Microsoft

(Product for $)

Distributors/Dealers/VARs

(Product for $)

(Product for $)

(Product for $)

Customers

(Upgrades for $)

Product Vehicles

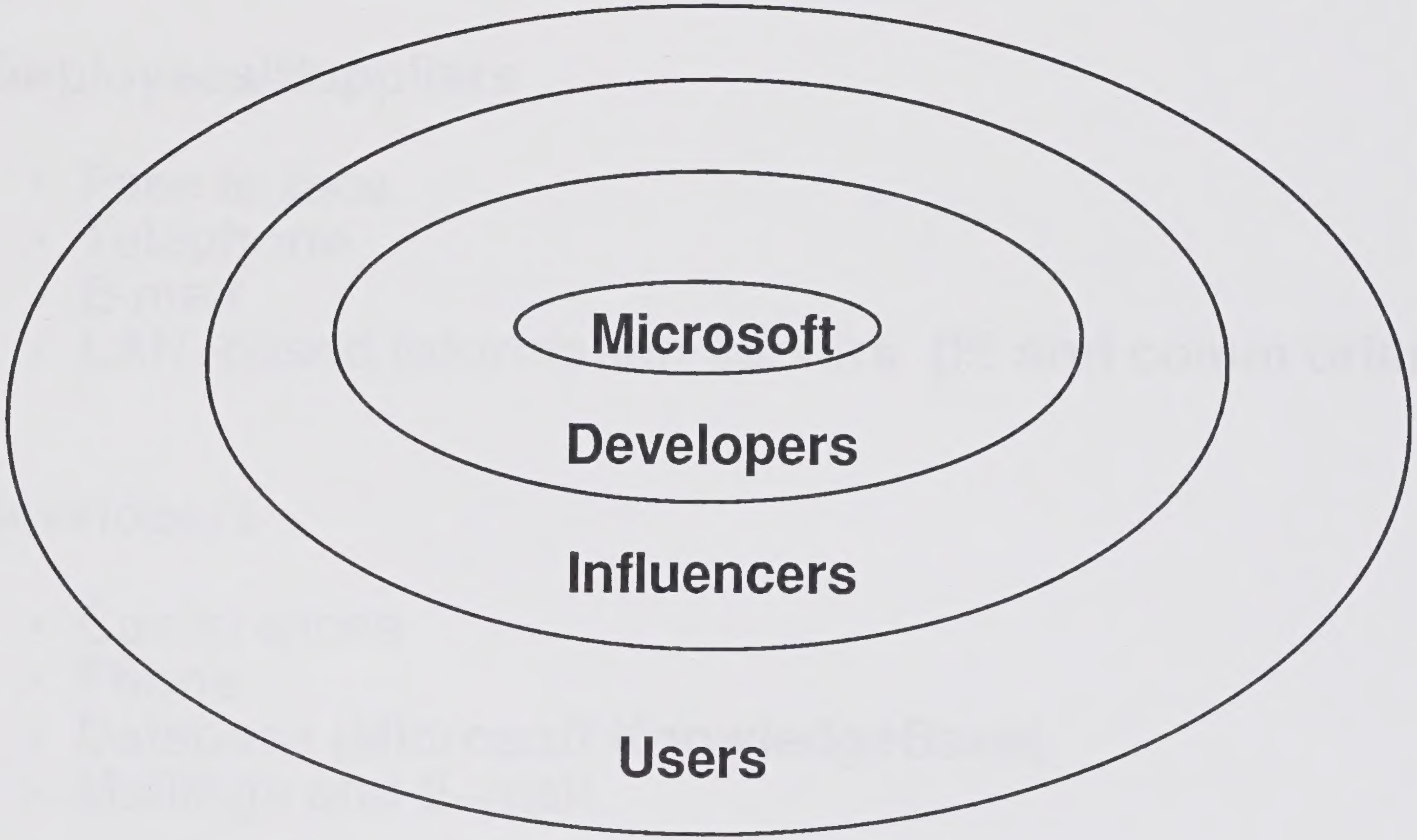
From Microsoft to distributors/dealers/VARs

- Rail, Truck, UPS

From reseller to customers

- UPS, Fed Ex, US Mail
- Store pick up

Information Channels



Microsoft

Developers

Influencers

Users

Two–way flow of information between each segment

Information Vehicles

Employees/Suppliers

- Face to face
- Telephone
- E-mail
- LAN–based information servers (IS and comm oriented)

Developers

- Conferences
- Phone
- Database (Microsoft KnowledgeBase)
- Mailings and E–mail

Information Vehicles (cont.)

Influencers

- Trade shows (COMDEX, InterOp, MacWorld, etc.)
- Trade magazines (PC Week, PC World, etc.)
- Online services (CompuServe, America Online, etc.)
- Phone support

Users

- Developers
- Influencers
- Online services
- Phone support (limited)
- Upgrade offers (US Mail)

The WAIS Opportunity

Integrated access to

personal

corporate

published

INFORMATION

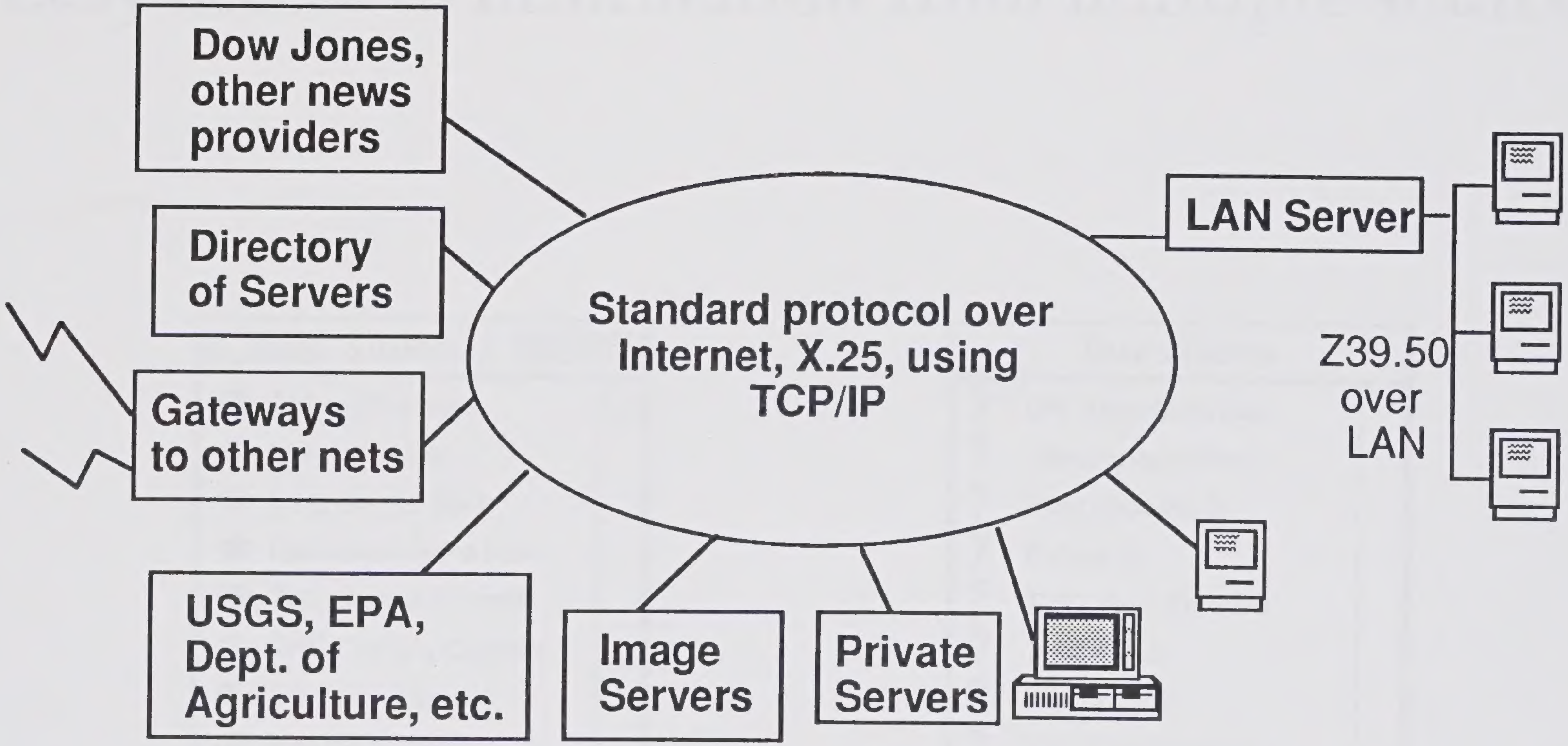
WAIS TECHNOLOGY

- **Beyond electronic mail** - ***Towards corporate memory***
- **Beyond databases** - ***Towards distributed free text databases***
- **Easy search and retrieval** - ***Towards computers for management***
- **Local and Wide Area integration** - ***From local to global***
- **Works in existing environments** - ***Accepting the multiplatform reality***

WAIS and Organizational Functions

- Customer services
  - Frequently Asked Questions application
- Public relations and communications
  - News clipping and news alert services
  - Multimedia applications
- Marketing and Sales
  - Competitive analysis
  - Contacts analysis
  - Call tracking
- Training
  - Frequently Asked Questions
  - Online documentation
- Organization
  - Integration of distributed organizations
  - Internal communications

WAIS Architecture



Dow Jones, other news providers

Directory of Servers

Gateways to other nets

Standard protocol over Internet, X.25, using TCP/IP

LAN Server

Z39.50 over LAN

USGS, EPA, Dept. of Agriculture, etc.

Image Servers

Private Servers

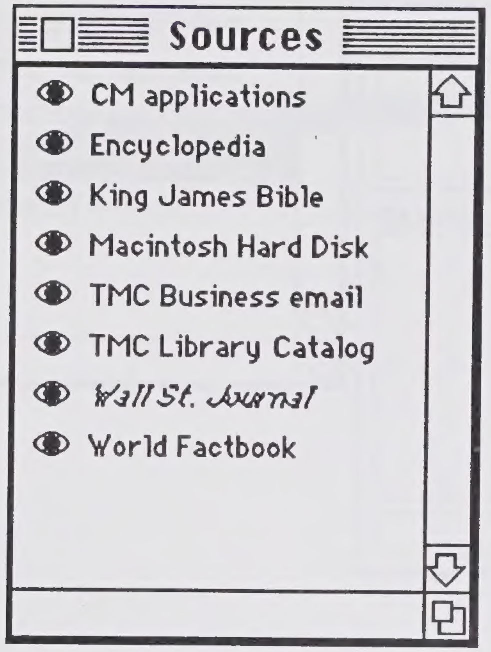
Users Needs:

- Selecting Servers
- Answering Questions
- Organizing Responses

Architecture Issues:

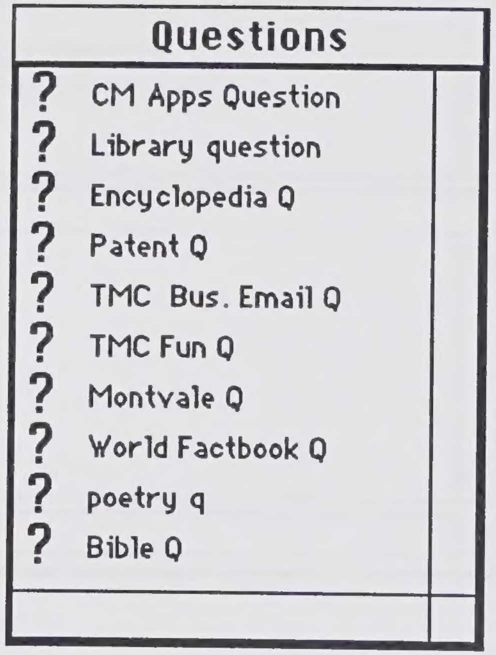
- Scalability
- Security
- Business model for servers
- Reliable Access

WAIStation: Easy access to information from multiple sources



Sources

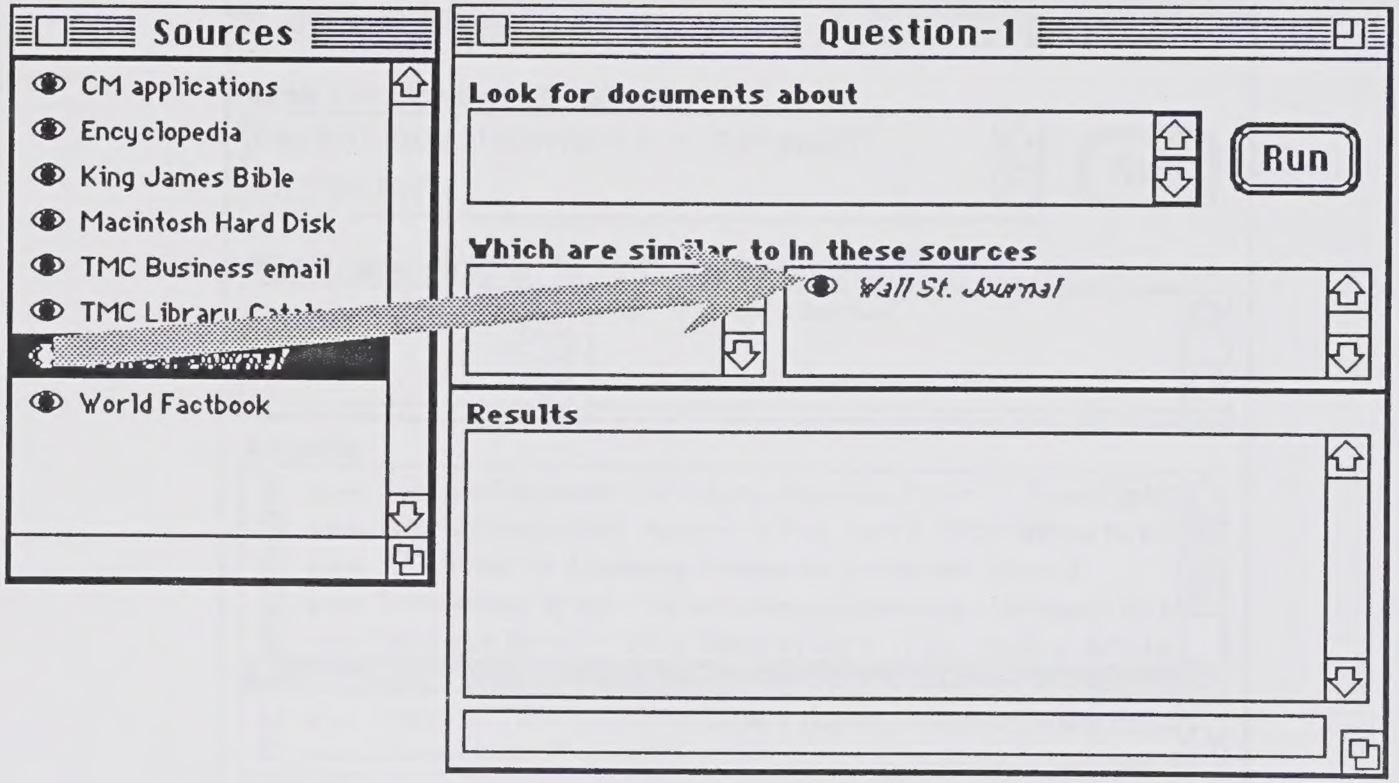
- CM applications
- Encyclopedia
- King James Bible
- Macintosh Hard Disk
- TMC Business email
- TMC Library Catalog
- Wall St. Journal
- World Factbook



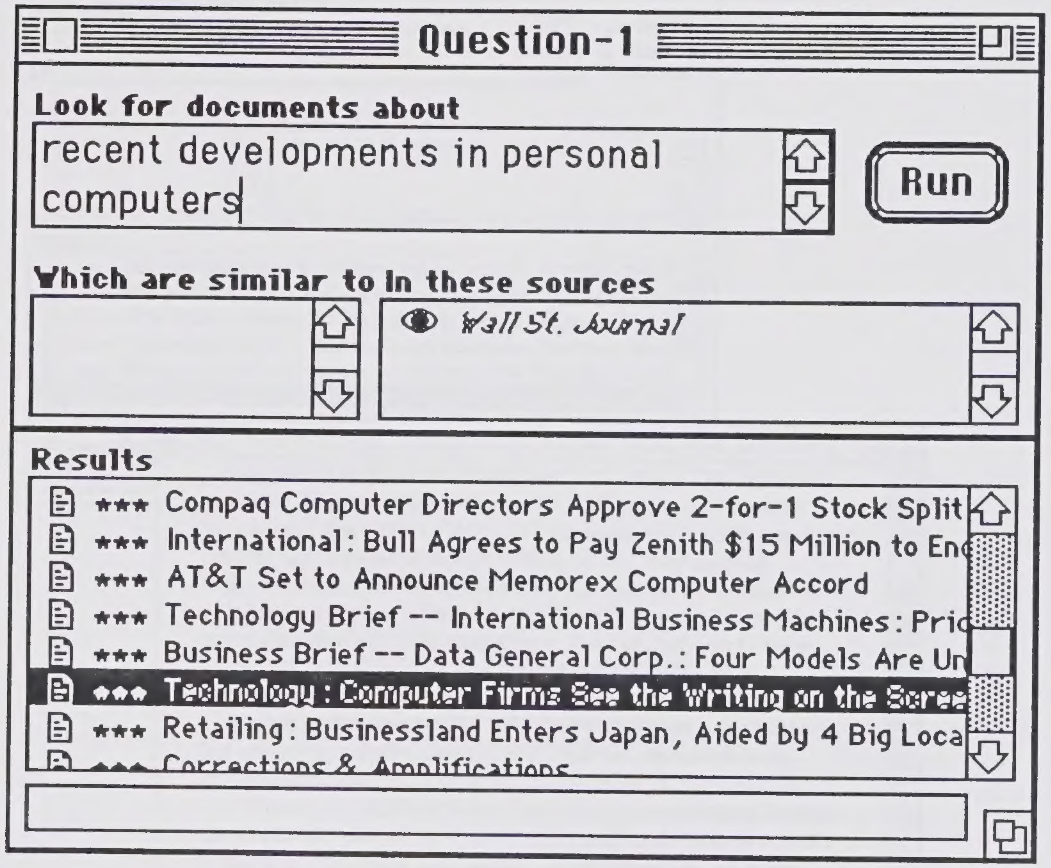
Questions

- CM Apps Question
- Library question
- Encyclopedia Q
- Patent Q
- TMC Bus. Email Q
- TMC Fun Q
- Montvale Q
- World Factbook Q
- poetry q
- Bible Q

Step 1: Select data sources


Sources
CM applications
Encyclopedia
King James Bible
Macintosh Hard Disk
TMC Business email
TMC Library Catal
World Factbook
Question-1
Look for documents about
Run
Which are similar to
In these sources
Wall St. Journal
Results

Step 2: Run intitial query



Look for documents about

recent developments in personal computers

Which are similar to

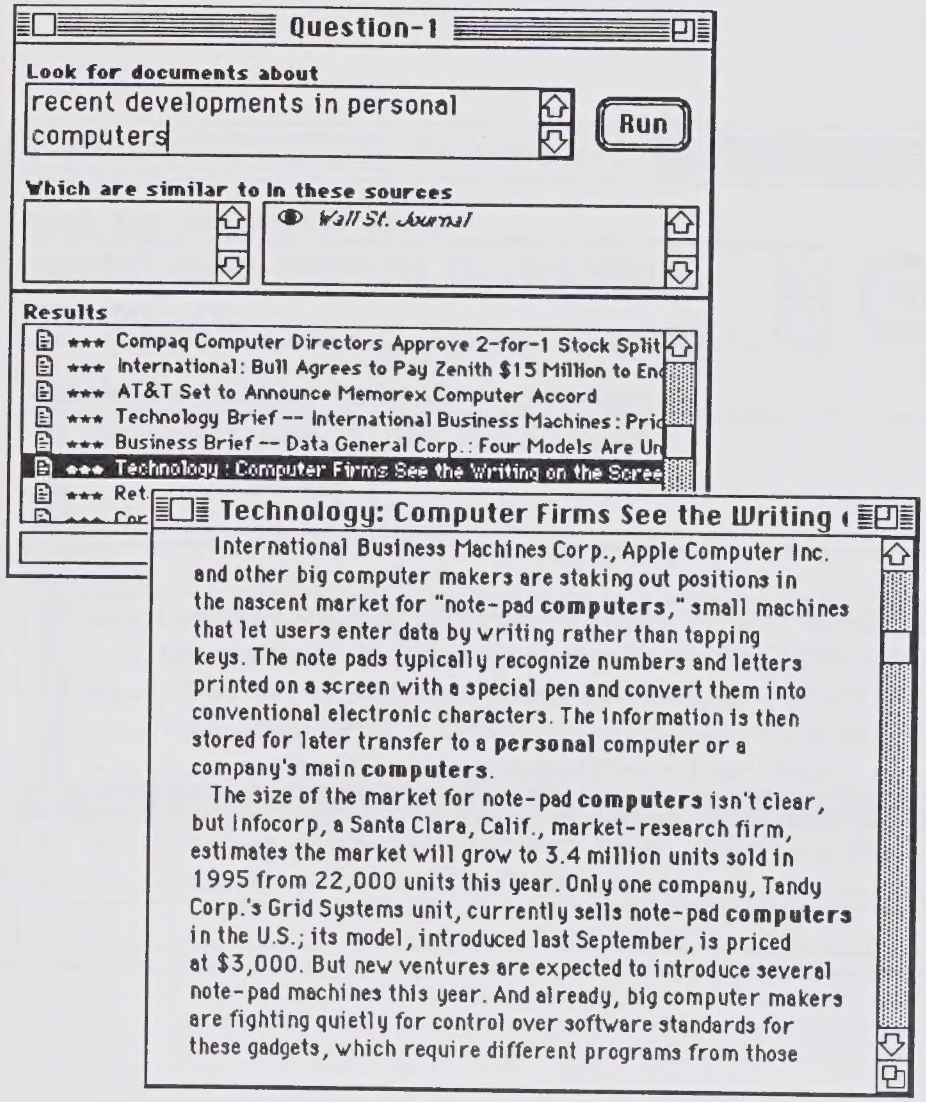
In these sources

- Wall St. Journal

Results

- *** Compaq Computer Directors Approve 2-for-1 Stock Split
- *** International: Bull Agrees to Pay Zenith $15 Million to En
- *** AT&T Set to Announce Memorex Computer Accord
- *** Technology Brief -- International Business Machines: Pri
- *** Business Brief -- Data General Corp.: Four Models Are Un
- *** Technology: Computer Firms See the Writing on the Scree
- *** Retailing: Businessland Enters Japan, Aided by 4 Big Loca
- *** Corrections & Amplifications

Step 3: Click to display a document



recent developments in personal computers

Wall St. Journal

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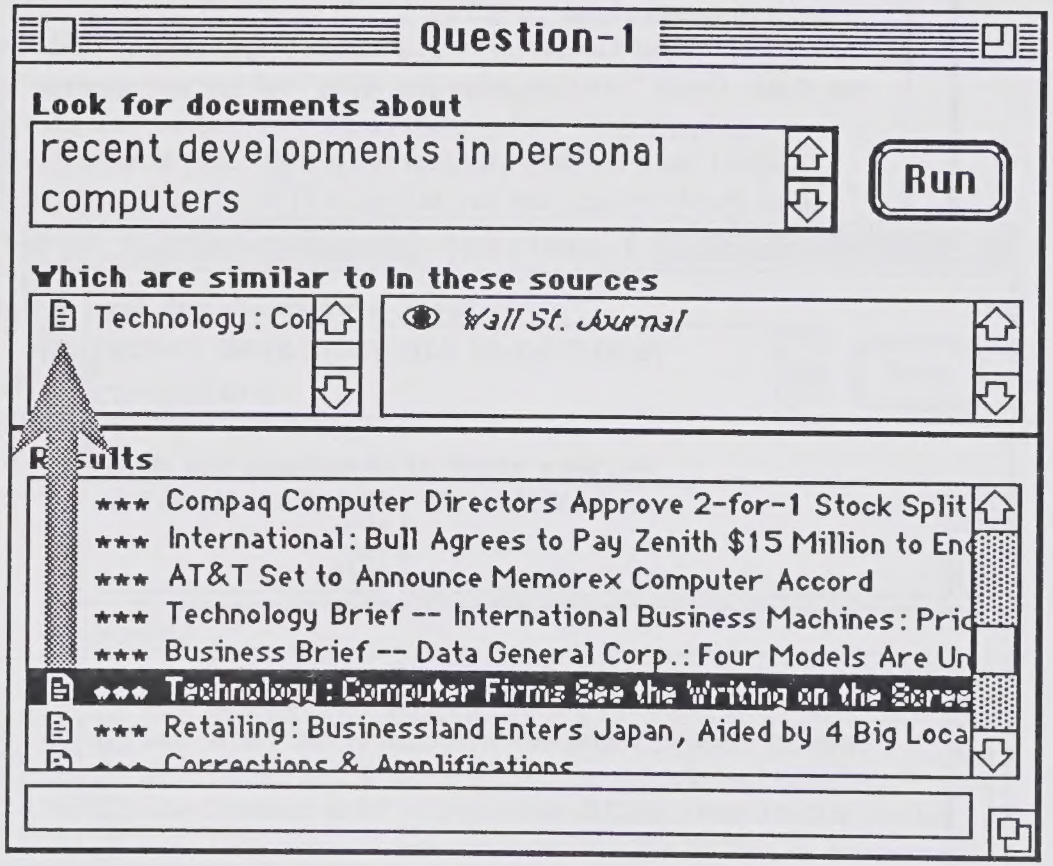
- *** Ret
- *** Cor

Technology: Computer Firms See the Writing

International Business Machines Corp., Apple Computer Inc. and other big computer makers are staking out positions in the nascent market for "note-pad **computers**," small machines that let users enter data by writing rather than tapping keys. The note pads typically recognize numbers and letters printed on a screen with a special pen and convert them into conventional electronic characters. The information is then stored for later transfer to a **personal** computer or a company's main **computers**.

The size of the market for note-pad **computers** isn't clear, but Infocorp, a Santa Clara, Calif., market-research firm, estimates the market will grow to 3.4 million units sold in 1995 from 22,000 units this year. Only one company, Tandy Corp.'s Grid Systems unit, currently sells note-pad **computers** in the U.S.; its model, introduced last September, is priced at $3,000. But new ventures are expected to introduce several note-pad machines this year. And already, big computer makers are fighting quietly for control over software standards for these gadgets, which require different programs from those

Relevance Feedback:
"Find me more like this one"


Question-1
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Technology : Cor

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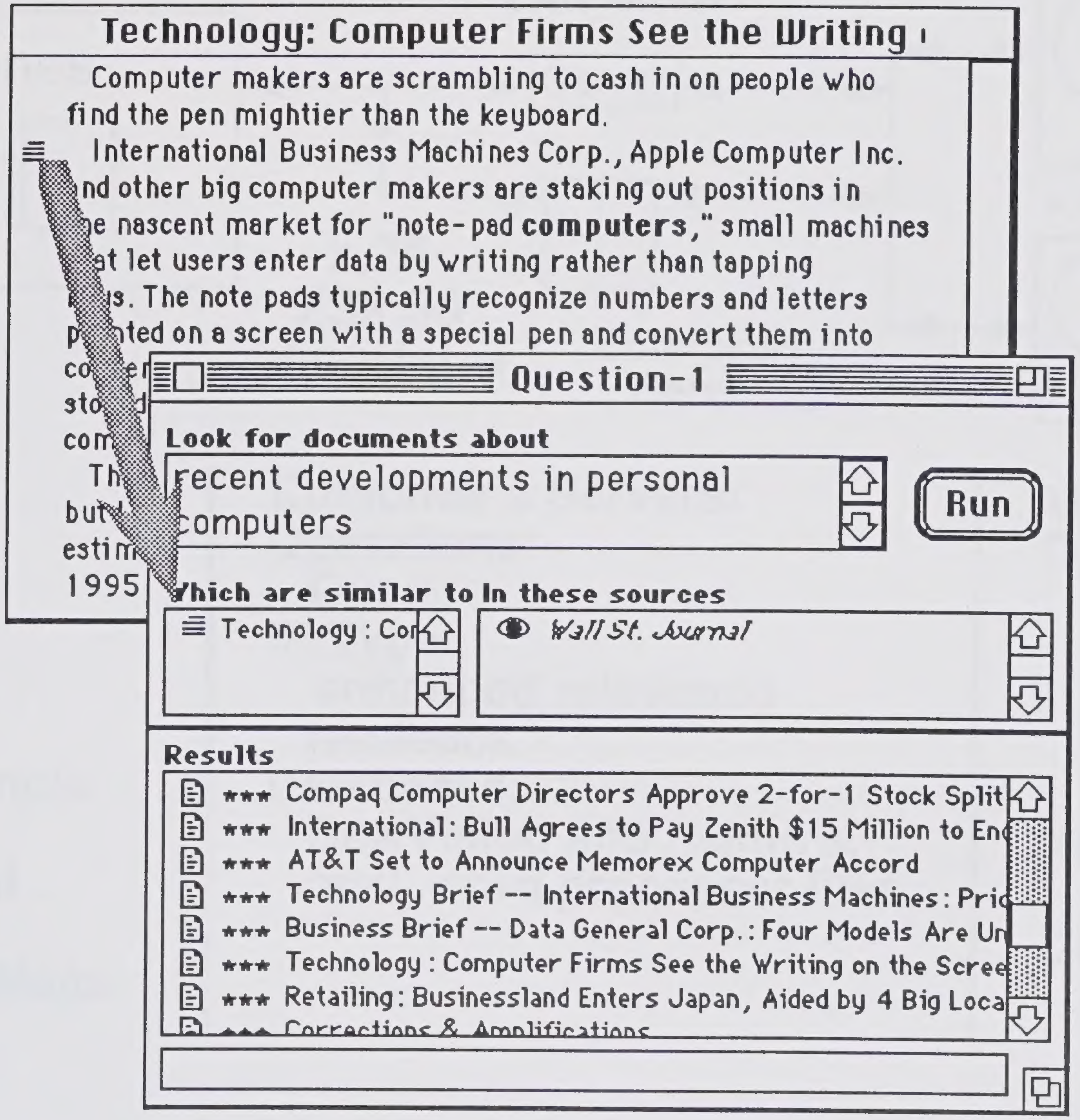
- *** Corrections & Amplifications

Relevance Feedback of a Paragraph



Technology: Computer Firms See the Writing

Computer makers are scrambling to cash in on people who find the pen mightier than the keyboard.

International Business Machines Corp., Apple Computer Inc. nd other big computer makers are staking out positions in e nascent market for "note-pad **computers**," small machines at let users enter data by writing rather than tapping s. The note pads typically recognize numbers and letters p nted on a screen with a special pen and convert them into co er sto d com

Th but estim 1995

Question-1

Look for documents about

recent developments in personal computers

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Technology : Co

In these sources

Wall St. Journal

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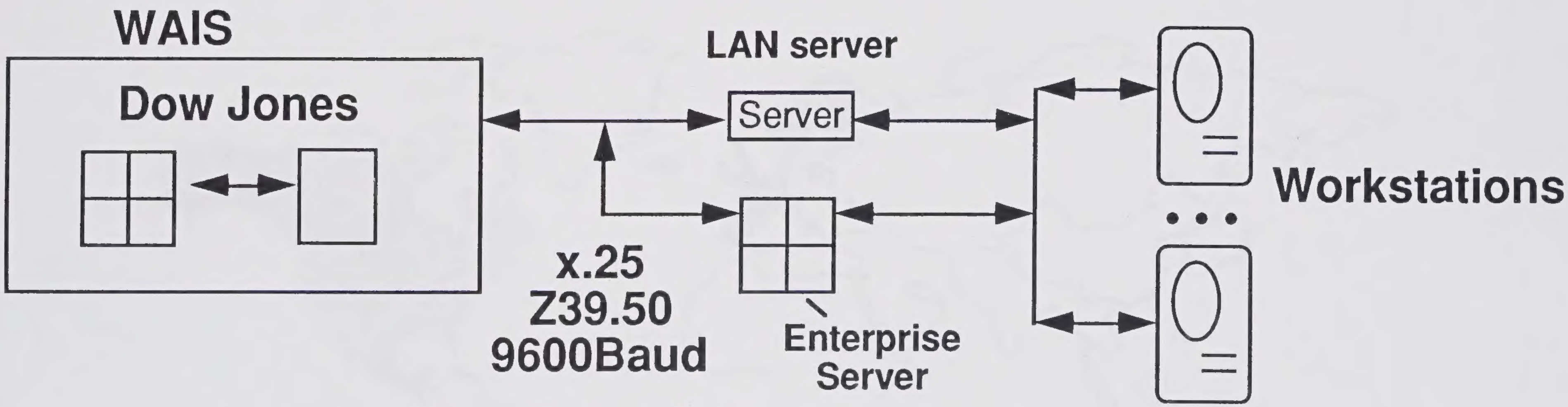
Demonstration System Structure



WAIS

Dow Jones

LAN server

Server

x.25
Z39.50
9600Baud

Enterprise
Server

Workstations

Operations:
- Archiving
- Queries
- Retrieval

IR Type:
- Broadcast
- Query by Example

Databases:
- Wall St Journal
- Barron's
- 400 Business Mags

Customer's Servers:

Operations:
- Queries

IR Type:
- enhanced relevance feedback

Databases:
- DowVision and memo's, mail, word processor files

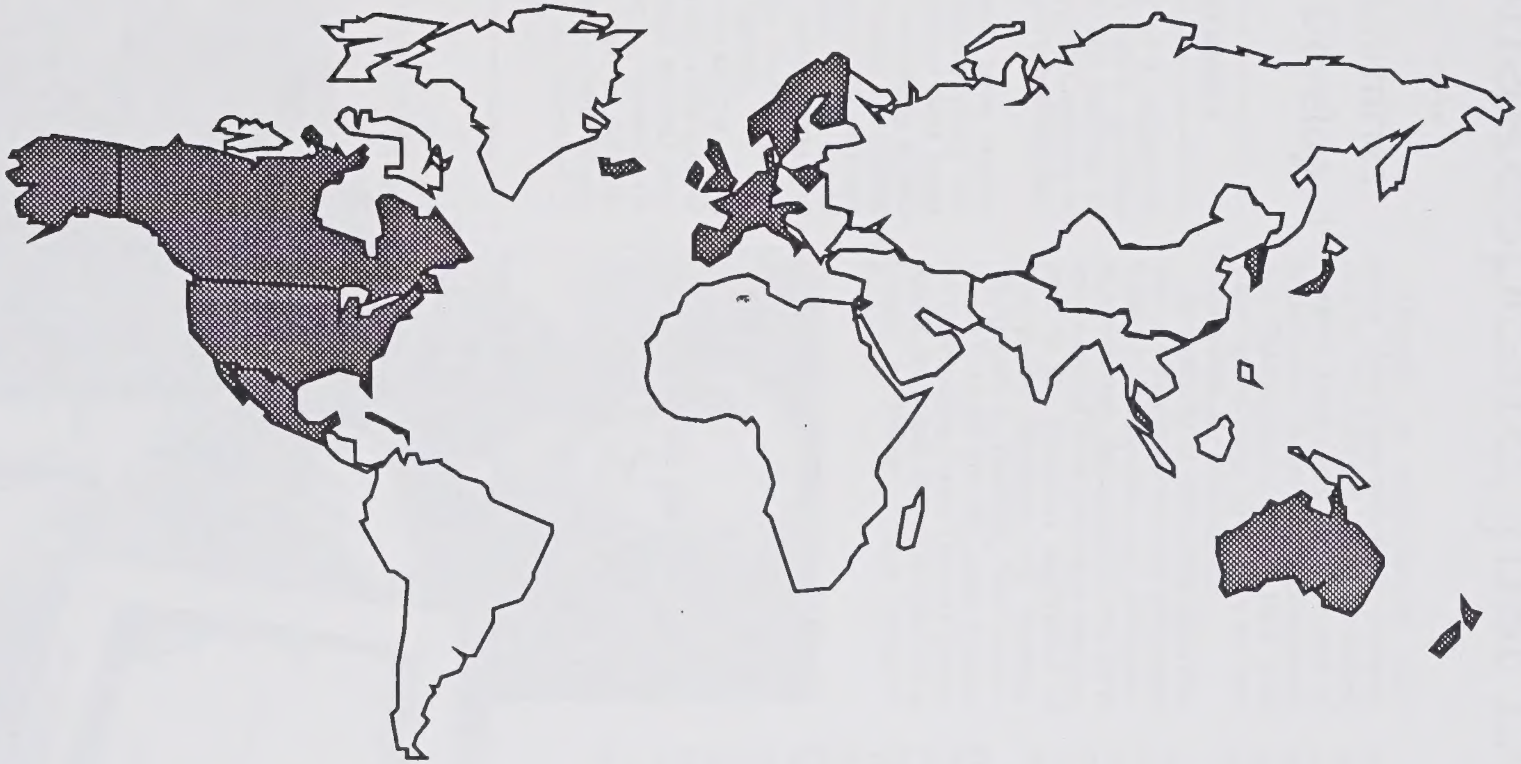
Mac:

Operations:
- Human Int
- Retrieval
- Queries
- "Caching" Docs
- User Profiles

IR Type:
- Query by example

Databases:
- Personal Text
- Cached data

WAIS on Internet



- Over 15,000 users on the Internet
- Users in 28 Countries: Mexico, Singapore, Finland, Australia, . . .
- 270 Databases, from 12 Countries: Norway, Canada, UK, . . . New database every day.
- VT-100 Interface in California: 240 each day, 4,600 machines

THE NEW YORK TIMES, WEDNESDAY, JULY 3, 1991

Business Day

The New York Times

For Shakespeare, Just Log On

Large PC Libraries Are Being Developed

By JOHN MARKOFF

The development of a nationwide data network will allow personal computer users to tap sources as large as the Library of Congress or receive their own personalized electronic newspapers.

Several innovations, taken together, have already demonstrated that searching vast computer data bases can be easier than consulting a card catalogue, and not nearly as difficult or expensive as computer searches are today. Computer users might read some Dickens more readily than they could check out David Copperfield from the local library.

Those in the industry say that users with little computer skills will soon be able to search through several terabytes of information, or several trillion characters of text, in seconds. The Library of Congress, with 80 million items, contains an estimated 25 terabytes of information.

Already, an experimental computer library has linked 150 universities to 40 sources of information, ranging from National Institutes of Health data to corporate documents and Shakespeare's plays. New software allows users to browse or zero in on particular information.

As methods of retrieving information are standardized and perfected, industry executives and computer scientists say, thousands of new services, ranging from electronic newspapers to the computer equivalent of free public libraries, will blossom. "Everyone is realizing how important it is to get into the mass market for information," said Thomas Koulopoulos, president of Delphi Consulting Group, a Boston market research firm.

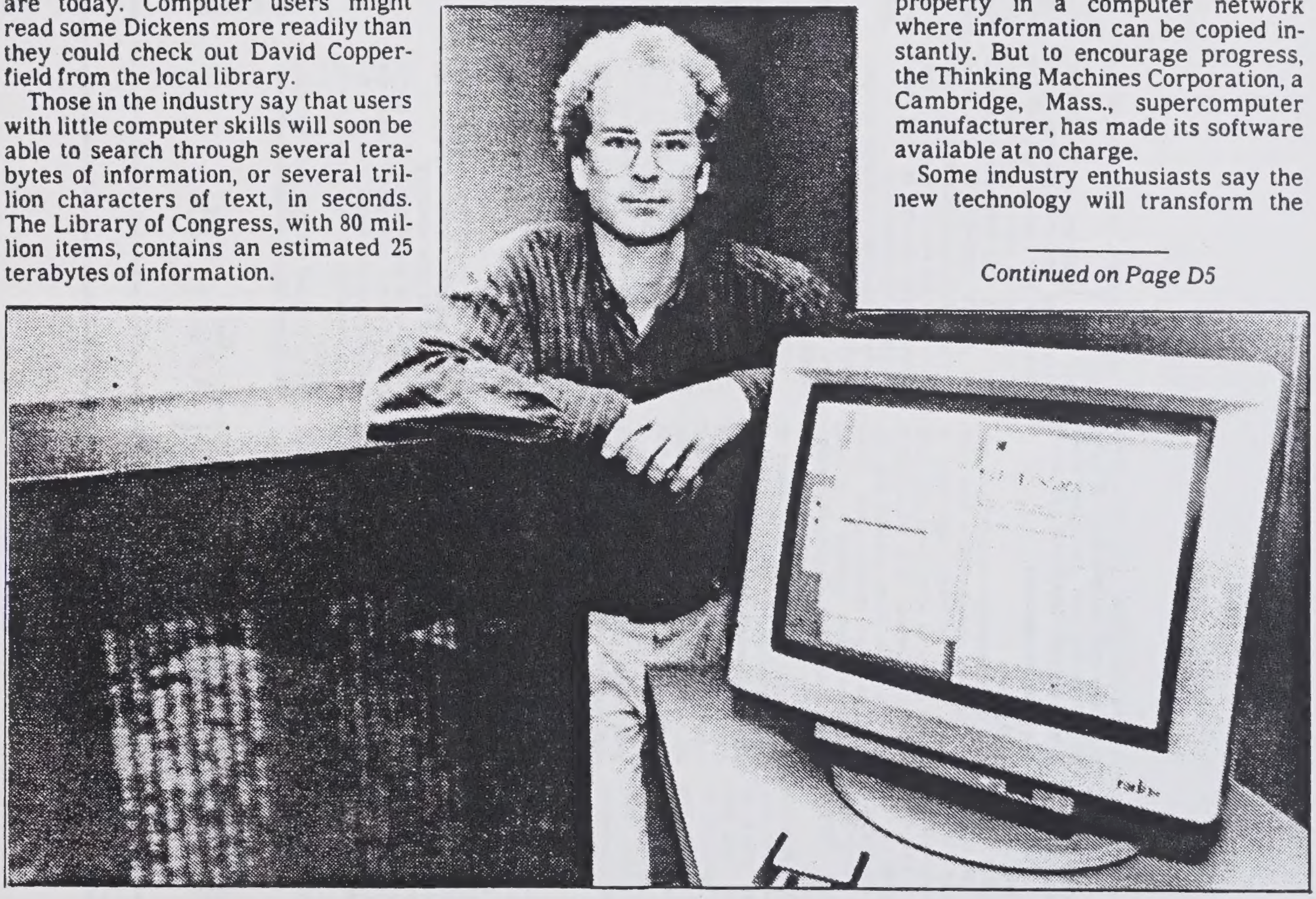
Such ready access to huge amounts of computerized information has been the dream of many in the industry. But a lack of computing power, effective software and high-speed digital networks has stalled progess until recently.

If many of the technical problems are being solved, major business and political disputes remain. The researchers acknowledge that they must resolve several questions of privacy and pricing before they can put the new methods to commercial use.

Many sources of information, like government documents, might be available free, but other services, including electronic newspapers, will be available only to those who pay. The industry has yet to settle on ways to protect and charge for intellectual property in a computer network where information can be copied instantly. But to encourage progress, the Thinking Machines Corporation, a Cambridge, Mass., supercomputer manufacturer, has made its software available at no charge.

Some industry enthusiasts say the new technology will transform the

Continued on Page D5



Mike Theiler for The New York Times

Brewster Kahle was the leader of the development team at the Thinking Machines Corporation for a nationwide computerized library system. His team's software links a CM2A Connection Machine, left, with a personal computer or work station like the Apple Macintosh II at right. Using high-speed data highways, the two machines can function together although they may be thousands of miles apart.

For Shakespeare, Just Log On

Continued From First Business Page

way computerized information is sold. Mitchell Kapor, the founder of the Lotus Development Corporation, predicts the growth of a new industry as significant as the personal computer business. Some companies, like Dow Jones & Company, that already provide computerized information over telephone lines have taken part in developing the new computer library.

The Search Is Simplified

In 1989, Thinking Machines enlisted the support of Dow Jones, Apple Computer Inc. and the KPMG Peat Marwick accounting and consulting firm to design the computer library, called Wide Area Information Servers, or WAIS (pronounced ways). The system permits computer users to quickly search through a huge volume of information even if it is stored at several distant locations.

The system lets users conduct searches by typing common English phrases instead of more complicated computer commands. While current systems like Dialog and Nexis require users to specify precisely the information they want, the new system can respond to a user's inferences. It initially presents a sample list of documents. The user chooses one or several, and then a "relevance feedback" program presents other documents most like the ones selected.

"This solves the problem of how to get to the information you need, getting not too much and not too little," said Esther Dyson, editor of Release 1.0, a computer industry newsletter.

> It will soon be possible to search through millions of items in seconds.

This is a sharp contrast to the way services operate today, Ms. Dyson said. A computer user may need to call seven or eight separate data bases depending on the kind of information needed.

The WAIS system lets users of Apple personal computers harness a network of Thinking Machines supercomputers and smaller "server" computers to search data bases stored by Dow Jones, KPMG and several corporations and universities. Users can also read electronic mail, enter their corporate electronic libraries and summon up a wide variety of documents, newspapers and magazines.

A 'Corporate Memory'

At Thinking Machines, the WAIS system serves as a "corporate memory," allowing employees to retrieve memos, documents and other internal information. Employees who may not be working together can share expertise.

"If someone did something in Los Angeles and I'm sitting in San Francisco, I may not know about the work," said Robin Palmer, a senior manager at Peat Marwick.

WAIS delivers information over the Internet, a collection of 2,600 high-speed public and private computer networks. This Government-sponsored system of data highways is rapidly being improved and turned to commercial uses.

The market for software that allows the rapid retrieval of computerized text is small but growing, according to industry analysts. In 1989, the United States had fewer than 60,000 users; by the next year, total sales were about $120 million. The Delphi Consulting Group expects the market to grow to 160,000 users and $235 million by 1992.

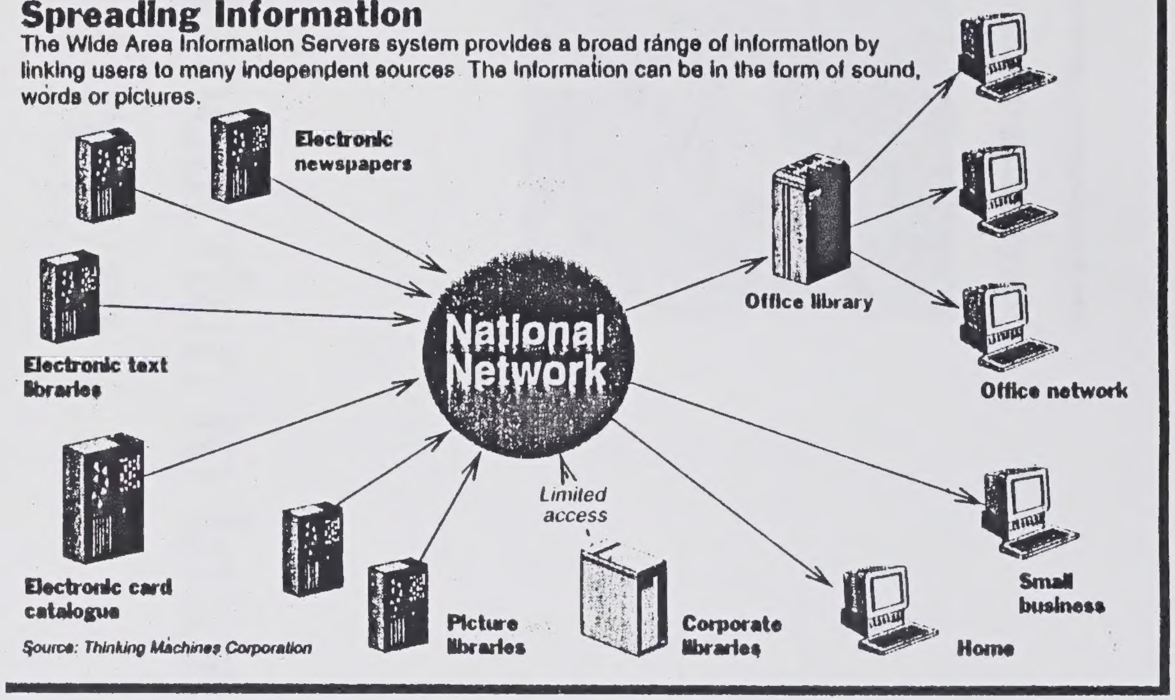
"Information retrieval technology is starting to spread from supercomputers all the way down to personal computers," said Brewster Kahle, a Thinking Machines scientist who has led the WAIS experiment.

The WAIS system is built on a procedure for retrieving information developed by librarians who initially set out to computerize their card catalogues. The procedure — known in the field as Z39.50 — now has the support of the Library of Congress, Apple, Sun Microsytems Inc., Next Inc., Dow Jones and Mead Data Central.

In the future, a special directory or "white pages" will keep an up-to-date list of all the separate sources on the network.

Spreading Information

The Wide Area Information Servers system provides a broad range of information by linking users to many independent sources. The information can be in the form of sound, words or pictures.



Source: Thinking Machines Corporation

Apple has its own electronic library project, borrowing its name, Rosebud, from the movie "Citizen Kane." The three-year-old project is based on the WAIS system, but adds features including the ability for a user to develop a personalized electronic newspaper.

Rosebud uses special programs — called "reporters" — that let customers specify the kinds of information and news they want to retrieve from the WAIS system every day. Researchers at Apple's Advanced Technology Group said that in the future the necessary retrieval software might be a standard part of a computer's operating system.

They expect improvements in the Internet computer network to greatly lower the cost of information searches, promoting the introduction of many new services. The Government proposes to expand and improve Internet by financing a National Research and Education Network, or NREN, that could extend a high-speed computer links into schools and communities across the country.

"With things like NREN, everthing could change overnight," said Tim Oren, an Apple researcher.

THE MERIT NETWORKING SEMINARS

Introduction to Internetworking and TCP/IP

John Scudder
Internet Engineer
Merit Network, Inc.

BIOGRAPHICAL NOTES

John Galen Scudder
Internet Engineer
Merit Network, Inc.

John Scudder has a decade of programming experience. He has programmed in C for five years and has been managing UNIX systems for two years. He holds a B.A. in Computer Science and Physics from the College of Wooster, with a special interest in simulations, and is a student in the Computer Science and Engineering graduate program at the University of Michigan. He presented a paper based on his academic research at the 1989 American Physical Society meeting and published an article based on that research in Wooster magazine. Currently, Mr. Scudder is an Internet Engineer on the NSFNET project at Merit Network. He is the lead troubleshooter for the ANSNET/NSFNET national IP backbone. Mr. Scudder has worked with Macintosh applications development and Appletalk networking. He is a member of the ACM and the Internet Society.

What is internetworking?

- An internetwork is a network of networks (of networks...)
- All these networks share a common language, procedures (Protocols)

Merit

What is internetworking? (cont)

- The "Internet" refers to the collection of interconnected networks that speak the Internet Protocol (IP) and related protocols
- The key: a common networking language for ALL machines on the internet

Merit

What does it provide?

Integrated services

- Remote login
- File transfer
- File access
- Directory services
- Electronic mail (text, multi-media)
- Real-time conversation
- Remote printing
- Timekeeping

Merit

What does it provide? (cont)

- Multi-vendor internetworking—supported on machines ranging from PCs to supercomputers
- Extensibility

  Applications are done in hosts, independent of the network infrastructure

  Topologically rich, easy to add new networks
- Geographic independence—same procedures, applications work across the room and across the country

Merit

How does it work?

Structure of the Internet

The Players

- Hosts—systems where applications run
- Routers
  Forward chunks of data ("packets") to their destination
  Communicate with other routers to determine paths
  Completely ignorant of applications

Merit

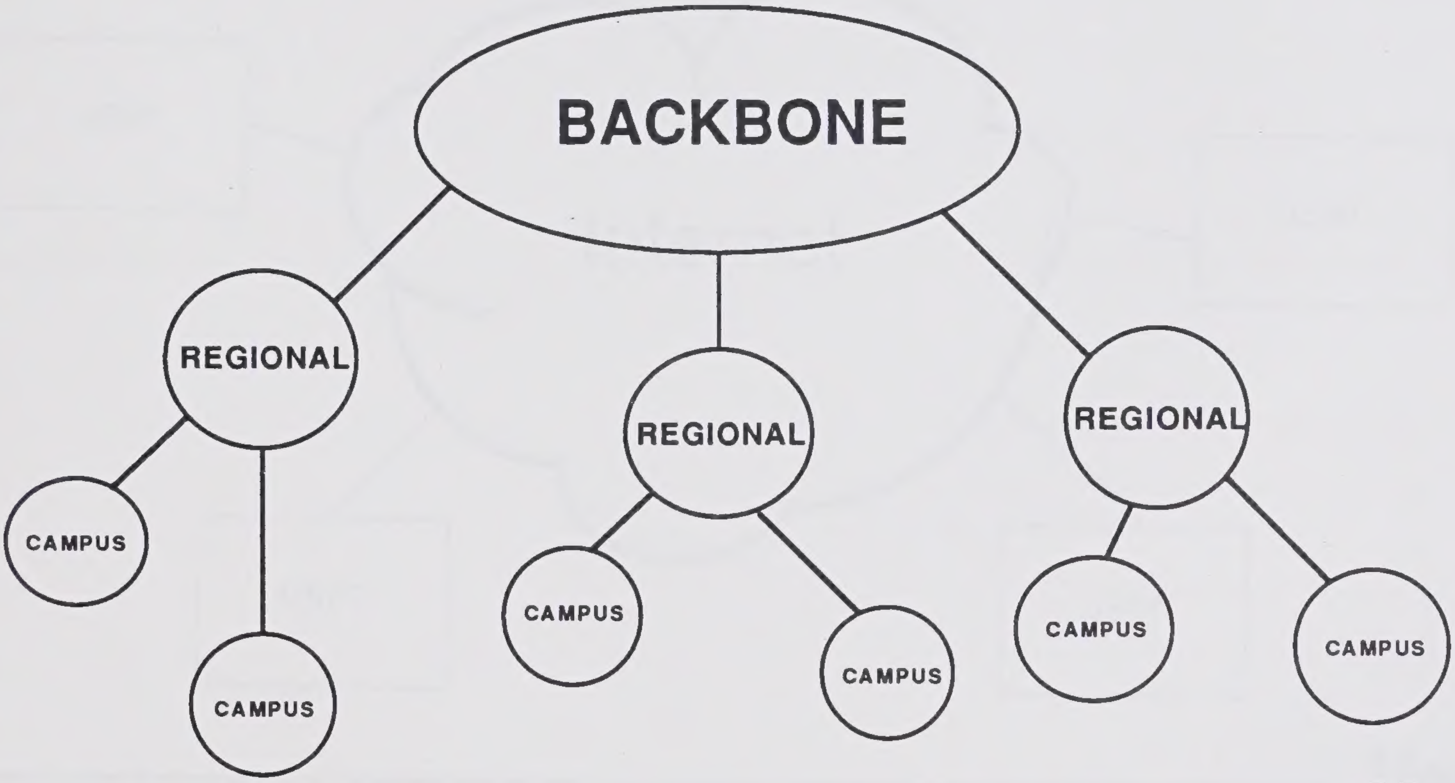
Hierarchy

Loosely organized into a three-level hierarchy (partly technical, partly administrative):

- Campus Networks—serve end users (may be further subdivided)
- Regional (Midlevel) Networks—serve many campuses within a geographic region
- Backbones—serve many regions on a national or international scale long-haul transcontinental (now transoceanic) carriers

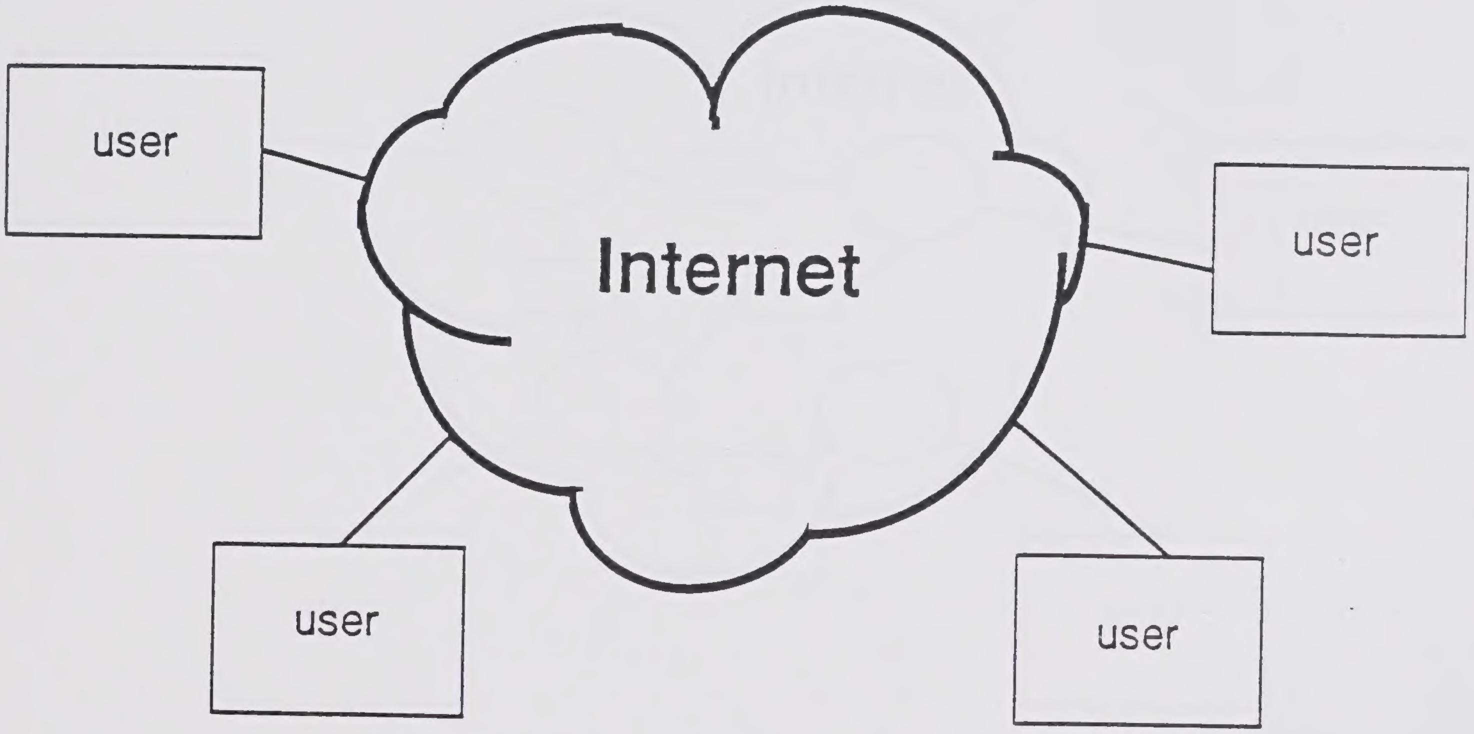
Merit

Conceptual View of the Internet


BACKBONE
REGIONAL
REGIONAL
REGIONAL
CAMPUS
CAMPUS
CAMPUS
CAMPUS
CAMPUS
CAMPUS

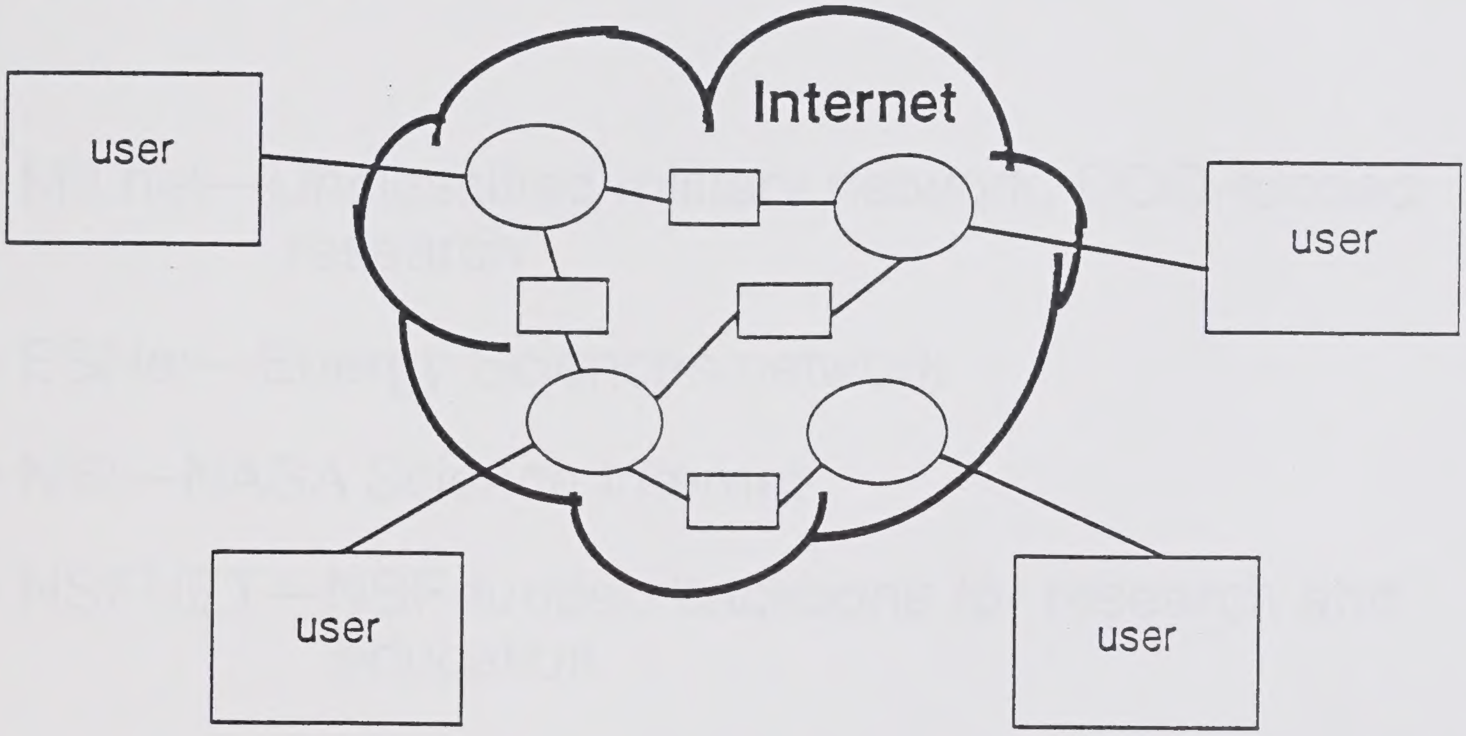
Merit

Users' View of the Internet


user
Internet
user
user
user

Merit

Actual View of the Internet


Internet
user
user
user
user

Merit

Backbones

- MILnet—Unclassified military network, DOD-funded research
- ESNet—Energy Sciences network
- NSI—NASA Science Internet
- NSFNET—NSF-funded backbone for research and education

Merit

Commercial Providers

- Advanced Network & Services, Inc. (ANS)
- Performance Systems International, Inc. (PSI)
- Alternet, Inc.
- Sprint
- CIX (Commercial Internet Exchange)
- EINet

Merit

Addressing

- Every host and router has a 32-bit address
- Address represented as four decimal numbers (w.x.y.z)
- Network numbers assigned by the GSI NIC, individual subnet/host numbers locally administered

Merit

Address Structure

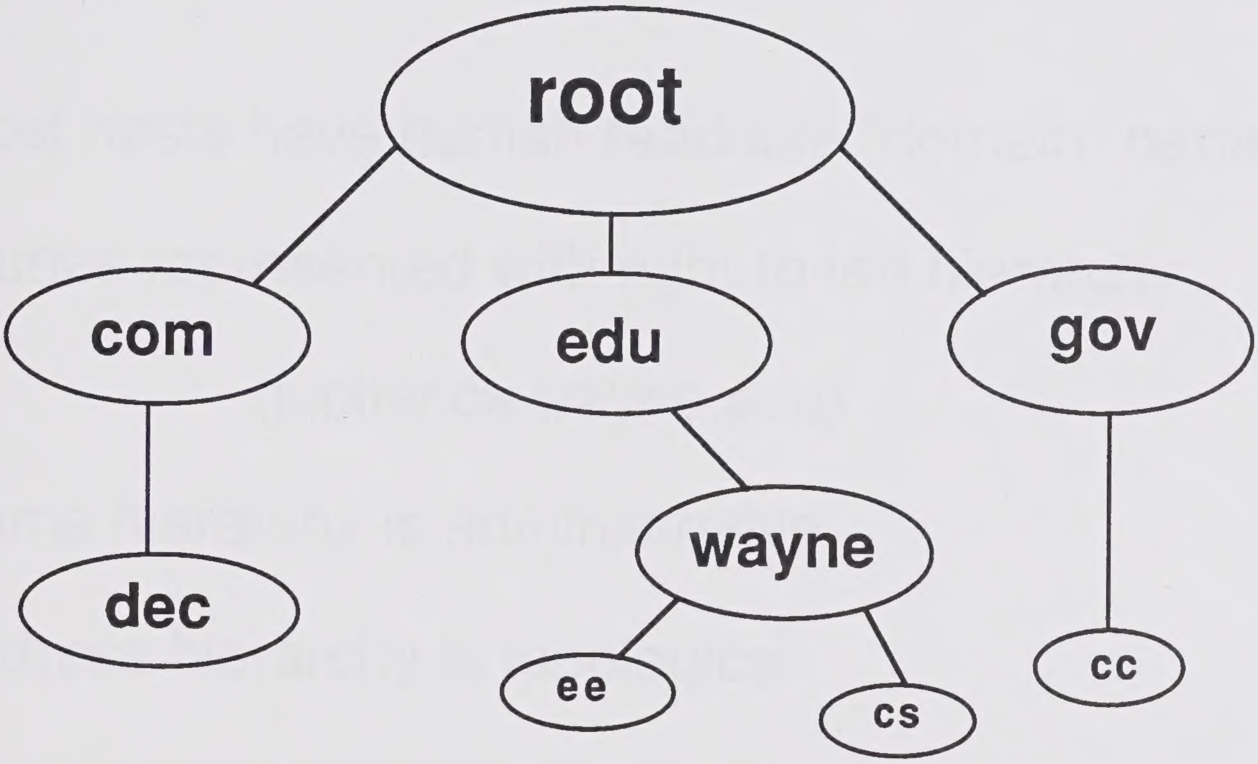
Address is hierarchical, with three variable-size parts:

- Network number—global routing
- Subnetwork number—local routing
- Host number—identifies single machine

131.103.	12.	19
Net	Subnet	Host

Merit

Domain Name Hierarchy


root
com
edu
gov
dec
wayne
ee
cs
cc

Merit

Naming

- Most hosts have human readable "domain" names
- Names represented with right-to-left hierarchy

  (jupiter.cs.wayne.edu)
- Name hierarchy is administrative
- Address hierarchy is topological

Merit

Protocols

- A protocol is a mutually agreed upon method of communication between parties
- Standard protocols allow communication between large numbers of dissimilar machines

Merit

Two basic types of service provided:

- Connection-oriented ("virtual circuit")—error-free, ordered, open/talk/close model (like the telephone)
- Connectionless ("datagram")—data may arrive out of order, not at all, no relationship between individual data packets (like the postal service)

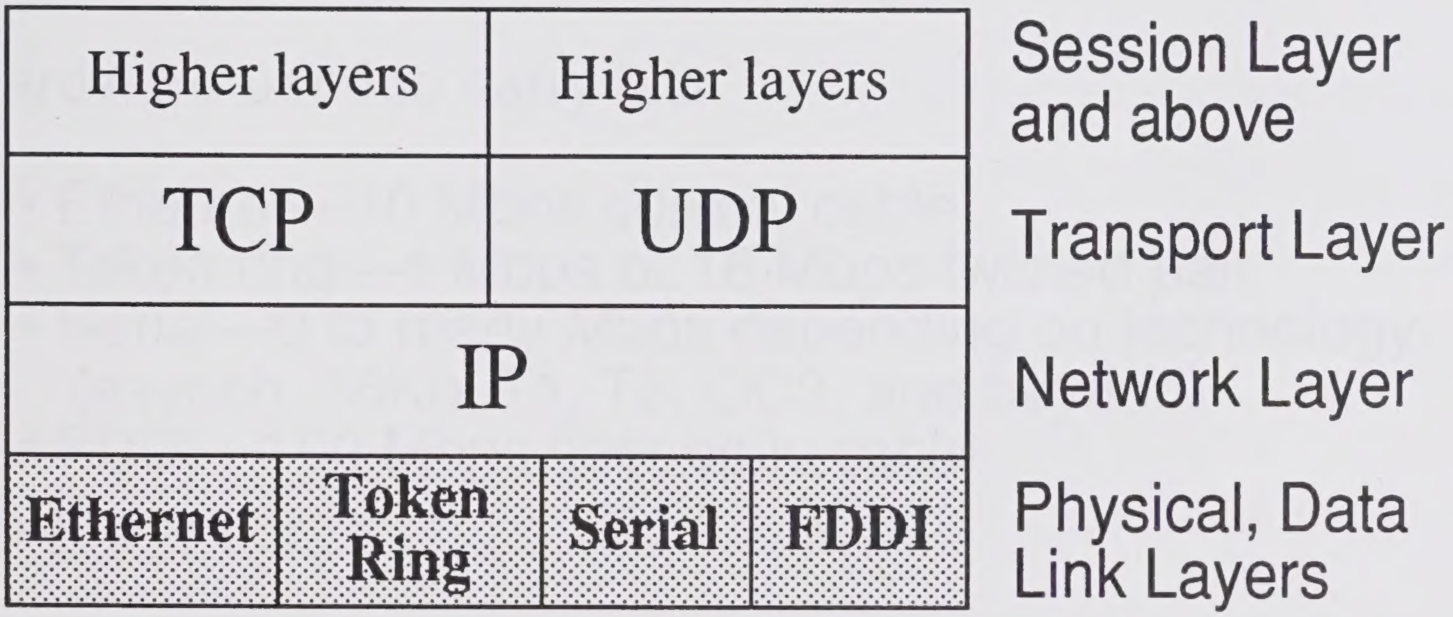
Merit

Layering

- Protocols build upon services provided by other protocols
- The relationships among these protocols define functional layers - a protocol at a higher layer uses another protocol at the next lower layer (but never at the same or higher layers)
- A protocol at a lower layer carries the protocol at the next higher layer as "opaque data" (encapsulation)
- The resulting "stack" of layered protocols is called a Protocol Suite

Merit

Layering in the TCP/IP Protocol Suite



Higher layers | Higher layers — Session Layer and above

TCP | UDP — Transport Layer

IP — Network Layer

Ethernet | Token Ring | Serial | FDDI — Physical, Data Link Layers

Merit

Physical, Data Link Layers

Media

Hardware used to carry bits

- Ethernet—10 Mbps coaxial cable
- Token ring—4 Mbps or 16 Mbps twisted pair
- Serial—0 to many Mbps depending on technology (asynch, 56Kb, T1, T3, OC3, and beyond)
- FDDI—100 Mbps fiber optic cable

Merit

Physical, Data Link Layers cont.

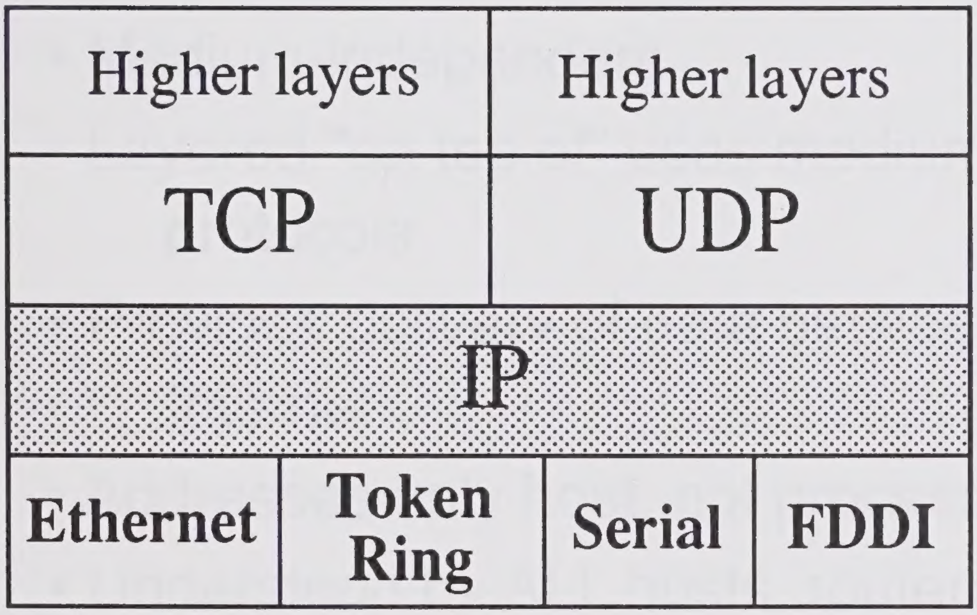
Media

Various media often require particular protocols (error detection, media access, etc.) local to piece of wire

- Ethernet—contention among senders
- Token ring—rotation of permission
- Serial—framing, error detection
- FDDI—rotation of permission

Merit

Layering in the TCP/IP Protocol Suite



Higher layers		Higher layers		Session Layer and above
TCP		UDP		Transport Layer
IP				Network Layer
Ethernet	Token Ring	Serial	FDDI	Physical, Data Link Layers

Merit

Network Layer

IP – Internet Protocol

- Medium-independent
- Layered "on top of" uses medium-dependent protocols
- Provides delivery of data between any points in the Internet
- Addresses only host, not process within host
- Understood by ALL hosts, routers

Merit

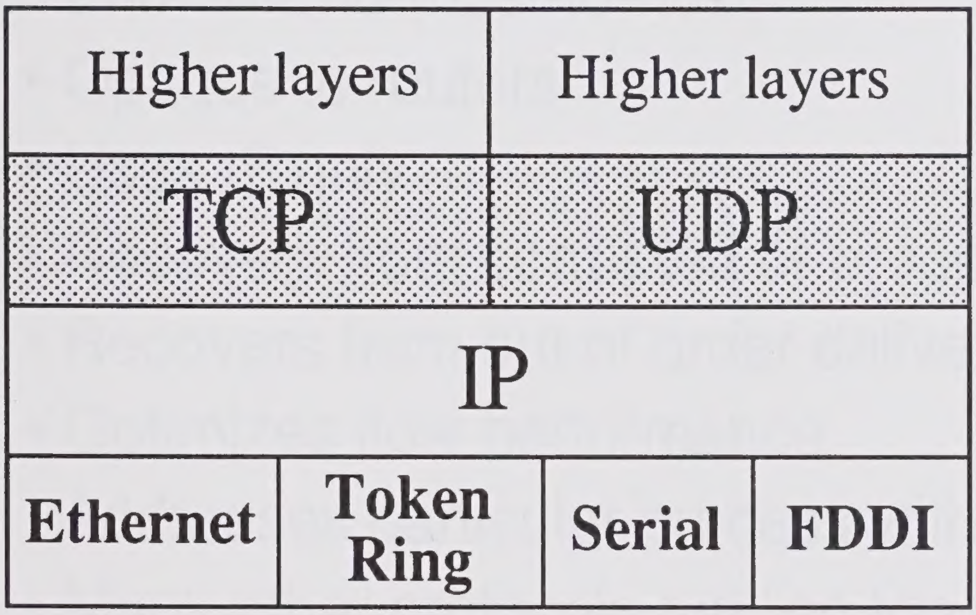
Network Layer

IP – Internet Protocol

- An IP packet might be corrupted or dropped (unreliable)
- Two related IP packets might be delivered out of order (unordered)
- Datagram service

Merit

Layering in the TCP/IP Protocol Suite



<table>
<tr><td colspan="2">Higher layers</td><td colspan="2">Higher layers</td><td>Session Layer and above</td></tr>
<tr><td colspan="2">TCP</td><td colspan="2">UDP</td><td>Transport Layer</td></tr>
<tr><td colspan="4">IP</td><td>Network Layer</td></tr>
<tr><td>Ethernet</td><td>Token Ring</td><td>Serial</td><td>FDDI</td><td>Physical, Data Link Layers</td></tr>
</table>

Merit

Transport Layer

TCP – Transmission Control Protocol

- End-To-End (host-to-host)
- Opaque to routers
- Uses IP only
- Recovers from corrupted or dropped IP packets
- Recovers from out of order delivery of IP packets
- Optimizes flow performance
- Addresses particular process within host
- Many other protocols run "on top of" TCP (mail, file transfer, etc.)

Merit

Transport Layer

UDP – User Datagram Protocol

- Also End-To-End
- Also opaque to routers
- Also uses IP only

Merit

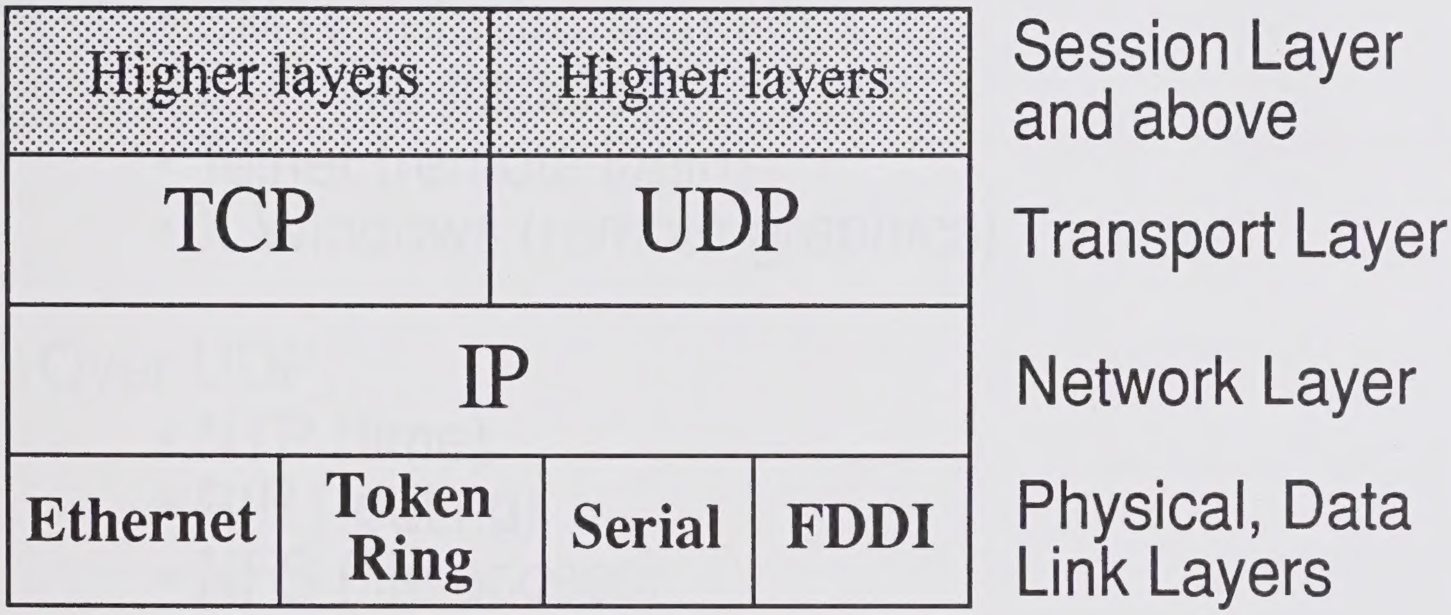
Transport Layer

UDP – User Datagram Protocol

- Datagram service
- Provides unreliable, unordered delivery of datagrams
- Can detect (and drop) corrupted packets
- Addresses particular process within host
- Other protocols run "on top of" UDP
- UDP and TCP are at the same layer, since both use IP only

Merit

Layering in the TCP/IP Protocol Suite



Higher layers		Higher layers		Session Layer and above
TCP		UDP		Transport Layer
IP				Network Layer
Ethernet	Token Ring	Serial	FDDI	Physical, Data Link Layers

Merit

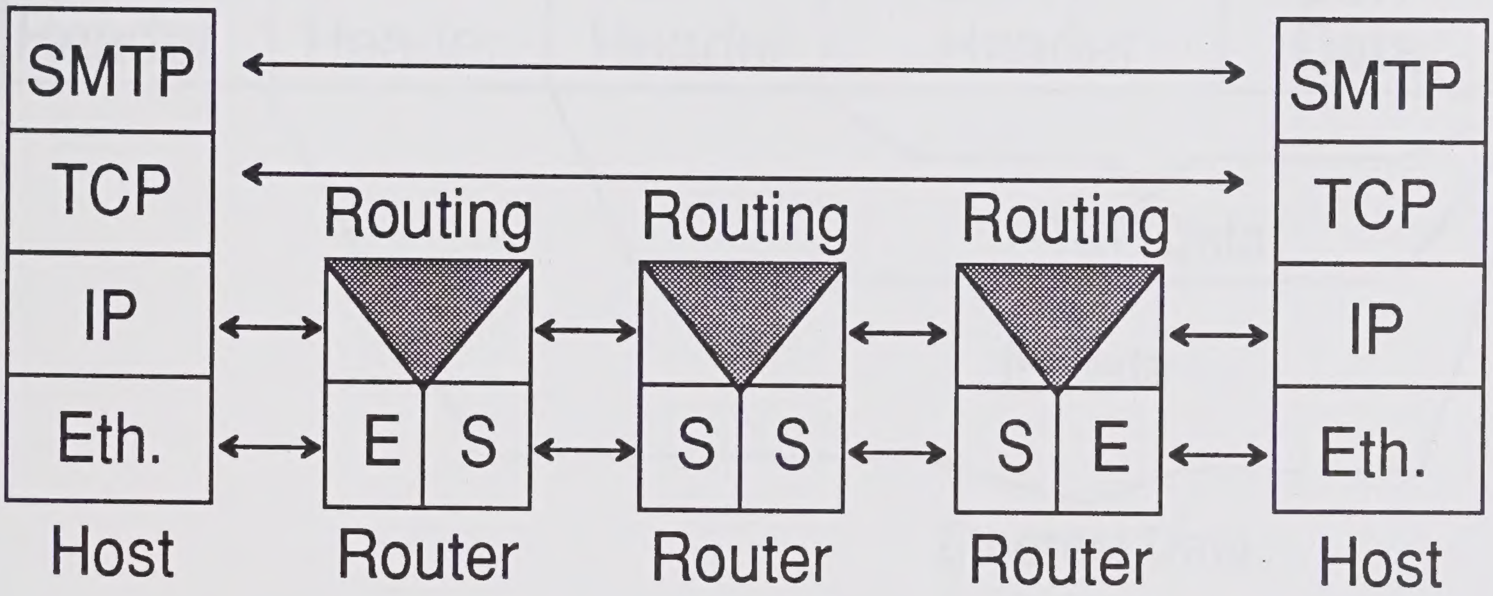
Higher-layer protocols

Over TCP:
- SMTP (electronic mail)
- FTP (file transfer)
- Telnet (remote login)
- X Windows (remote graphics)

Over UDP:
- NTP (time)
- RIP (routing)
- NFS (file access)
- DNS (domain name service)

Merit

Layering Interaction



SMTP

TCP

IP

Eth.

Host

Routing

E | S

Router

Routing

S | S

Router

Routing

S | E

Router

SMTP

TCP

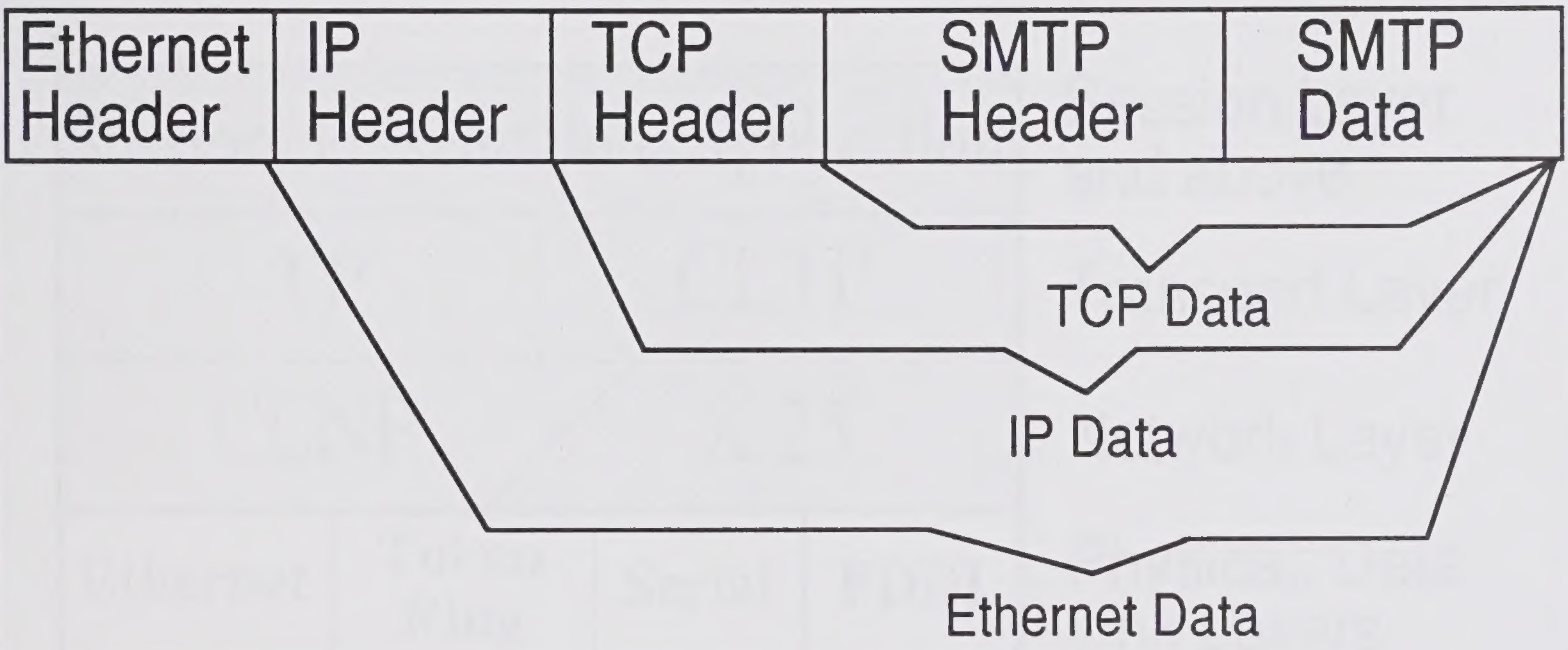
IP

Eth.

Host

Merit

Encapsulation



Ethernet Header | IP Header | TCP Header | SMTP Header | SMTP Data

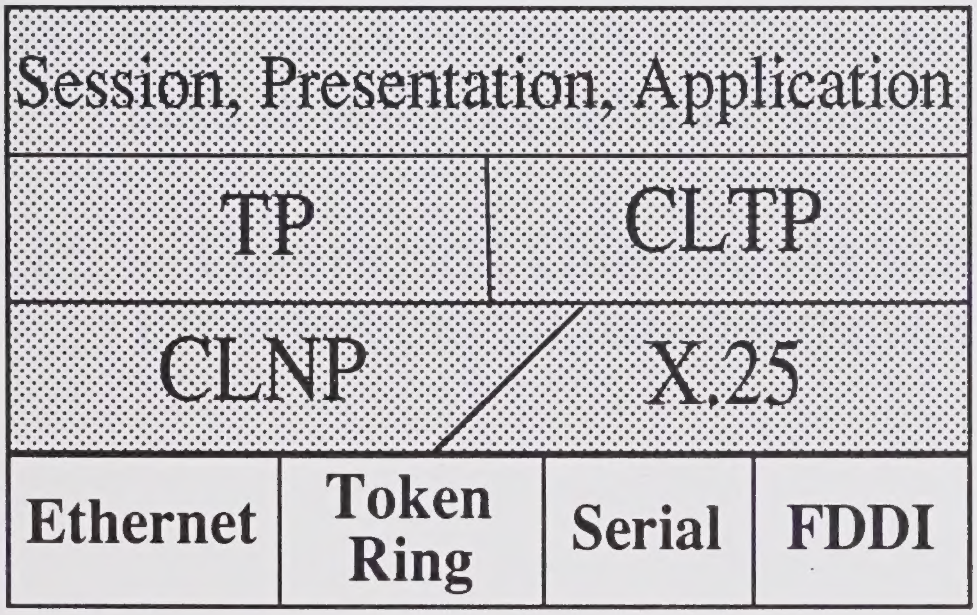
TCP Data

IP Data

Ethernet Data

Merit

Layering in the OSI Protocol Suite



Session, Presentation, Application				Session Layer and above
TP		CLTP		Transport Layer
CLNP		X.25		Network Layer
Ethernet	Token Ring	Serial	FDDI	Physical, Data Link Layers

Merit

OSI Layering

Connectionless Network Protocol (CLNP)
- Like IP with bigger addresses (20 bytes)

X.25 — Connection-Oriented Network Service (CONS)
- Provides (semi) reliable network layer service

Merit

OSI Layering

ISO Transport Protocol (TP)

- Service like TCP

  five versions of protocol based on quality of underlying network service. TP4 necessary for use over CLNP

ISO Connectionless Transport Protocol (CLTP)

- Service like UDP

Session layer and above

- no real parallel in TCP/IP (similar functionality part of applications)

Merit

Comparisons to other technologies

Bitnet

- Bitnet is based on RJE of 80 column "decks"
- Only mail, file transfers, dispatch messages
- Forwards entire message at a time—large file can block other users (no interleaving)
- Uses mainframes as routers
- All "routers" must understand all services (not easily extensible to other services), know all addresses
- Semi-automated routing (many hand-tweaked tables)

Merit

Comparisons to other technologies

Bitnet II

- Bitnet over TCP
- Uses Internet like a virtual leased-line service
- Overlays Bitnet topology on Internet
- No integration in routing
- No integration in applications
- Doesn't address fundamental Bitnet problems

Merit

Comparisons to other technologies

PC Lans

- Good local services, easy to use
- Proprietary protocols
- Don't scale up to large networks
- Often use application gateways (staging machines, multi-step processes, limited services)

Merit

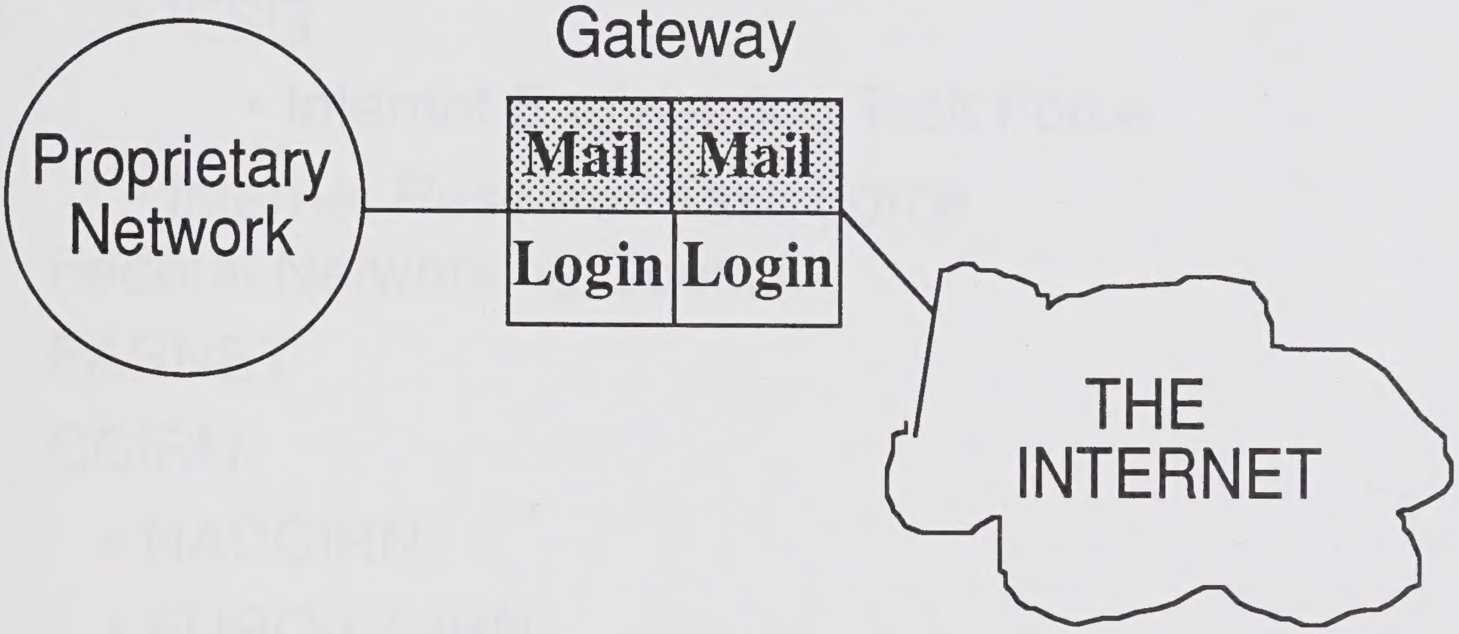
Comparisons to other technologies

Vendor networks (SNA, DECnet)

- Proprietary protocols
- Don't scale up (DECnet)
- Tightly coupled to vendor hardware/software architecture (better support of vendor- specific services)

Merit

Application Gateway


Gateway
Proprietary Network
Mail
Mail
Login
Login
THE INTERNET

The players behind the scenes

Internet Activities Board

- IESG
    - Internet Engineering Task Force
- Internet Research Task Force

Federal Networking Council

FARNET

CCIRN

- NACCIRN
- EURO-CCIRN
- PAC-CCIRN

Merit

Future Trends 1

ISO Open Systems Interconnection (OSI) protocols

ISO and national standards bodies are developing a set of protocols as International Standards

- Governmental use of OSI defined by GOSIP
- International networking
- DECnet Phase V

Merit

Future Trends 2

Applications expand with bandwidth

Data-intensive applications (video, voice, medical imaging, etc.) become practical when sufficient bandwidth is available

Very high speeds, very large internets

- Speeds in gigabit/sec range
- Millions of hosts, very complex topologies
- Current protocols, technologies may be insufficient

Merit

THE MERIT NETWORKING SEMINARS

Project Connect

Connecting K-12 Netware Servers to the Internet

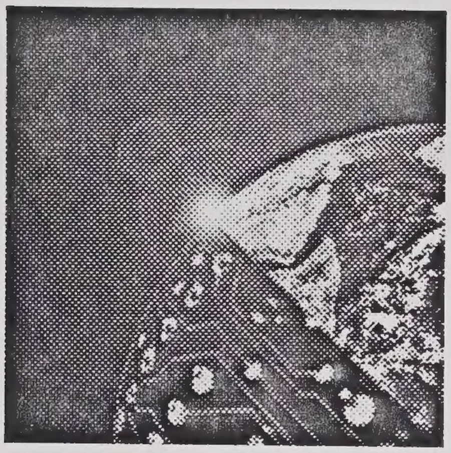
Dana Sitzler
K-12 Outreach Coordinator
Merit Network, Inc.

BIOGRAPHICAL NOTES

Dana Sitzler
MichNet Outreach Coordinator
Merit Network, Inc.

Dana Sitzler is the Merit/MichNet Outreach Coordinator primarily responsible for Merit's K-12 activities. In this capacity, she has been involved with a number of state and national initiatives promoting the use of networking in public schools. Ms. Sitzler has written articles and prepared and given countless presentations advocating the sharing of resources and the vast communication capability of our existing education and research networks. She was recently appointed by Michigan's Governor Engler to the Advisory Council for the Council of Great Lakes Governors' Pioneering Partners initiative. She has a B.A. in Psychology from the University of Michigan and a B.A. in Computer Science from Wayne State University.

THE MERIT NETWORKING SEMINARS



Interactive Communications and Simulations

Clancy Wolf
School of Education
University of Michigan

BIOGRAPHICAL NOTES

Clancy J. Wolf, Ed.D.
School of Education
University of Michigan

Clancy Wolf is currently at the University of Michigan where he is involved in several computer mediated communications projects. For the past seven years he has been the Technical Director of the Interactive Communications & Simulations, a collection of large scale activities mediated via the Internet and commercial data networks. Dr. Wolf designed and supervises the Columbus Odyssey, which has students following reports from a family retracing Columbus' route and participating in other curricular activities among schools.

Dr. Wolf is also a team member of the National Clearinghouse for Environmental Education & Teaching, a new project funded by the U.S.E.P.A. at the University of Michigan. His responsibilities in this role include creating a document retrieval system for people interested in Environmental Education. This system will be available through direct dial-in lines and the Internet.

In addition to being technically competent with the communications software available for most computers found in K-12 schools, the "How?" in telecommunications, Dr. Wolf is interested in the "Why?" and the "Who?" questions surrounding the appropriate use of this technology once it has been put into place.

Dr. Wolf has made numerous presentations at educational conferences across the U. S. and around the world. He has acted as a consultant to the United States Department of Defense Dependents' School system in designing and running courses in computer programming, history and science, all mediated by international computer networks.

Dr. Wolf has a B.A. in Mathematics/Physics from Whitman College in Walla Walla, Washington, and a M.Ed. in Curriculum and Instruction - Secondary Education, from Bowling Green State University, Bowling Green, Ohio. His Ed. D. in Science Education is from the University of Michigan.

Interactive Communications & Simulations

I.C.S. The Global Classroom

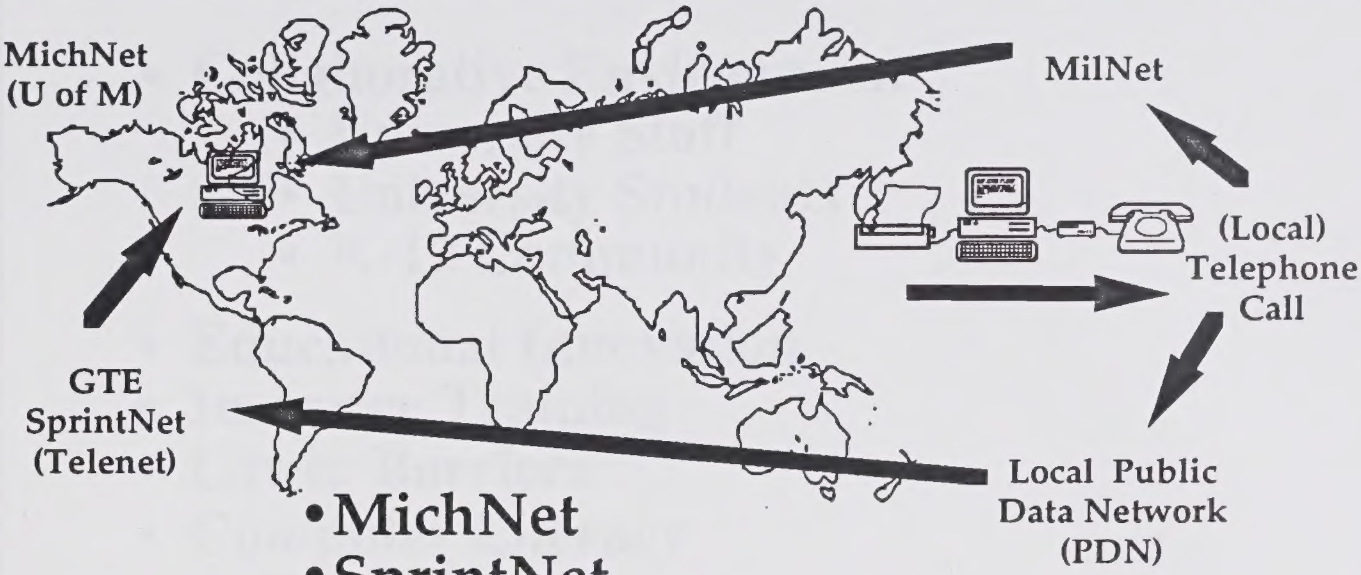
K-12 Telecommunications

- Service Providers
  - FrEdMail Project
  - AT&T Learning Network
  - GTE Education Services
  - Apple Global Education Network
  - Computer Pals Across the World

K-12 Telecommunications

- Structure Providers
  - National Geographic Kids Network
  - TERC Star Schools (defunct?)
  - I.C.S., University of Michigan

Connecting


MichNet
(U of M)
MilNet
(Local)
Telephone
Call
GTE
SprintNet
(Telenet)
Local Public
Data Network
(PDN)

- MichNet
- SprintNet
- Local PDN
- Internet

I.C.S. - Participants

Public High Schools
Rural K through 12 Schools
Colleges and Universities
Private Schools
Church Affiliated Schools
Local and International Schools
Department of Defense Dependent's Schools

Gifted and Talented
Mainstream
Special Education
Adult Education
University
Juvenile Offenders

I.C.S. - Goals

- Collaborative Environment
  - University Staff
  - University Students
  - K-12 Community
- Educational Innovation
- Inservice Training
- Lower Barriers
- Computer Literacy

Offerings

- ■ Arab-Israeli Conflict Simulation
- ■ International Poetry Guild
- ■ 1990's Earth Odysseys

- ■ United States Constitution Simulation
- ■ Environmental Decisions
- ■ Space Forum

1990's Earth Odysseys

Goals:

- Global Awareness
- Social Differences
- Environmental Differences
- Personal Lifestyles

1990's Earth Odysseys

Curriculum
- Science & Social Studies
- Structured Activities
- Examine Personal Lifestyles
- Compare Network Reports

Focus On Travellers
- Varied Group of Travellers
- Unique Itineraries
- Daily Reports or Thoughts
- Parallel Activities

Visual Information

- Canon XAPSHOT Still Video Camera
- Computer Eyes Video Digitizer
- Graphics Workshop

- Any GIF Viewing Software

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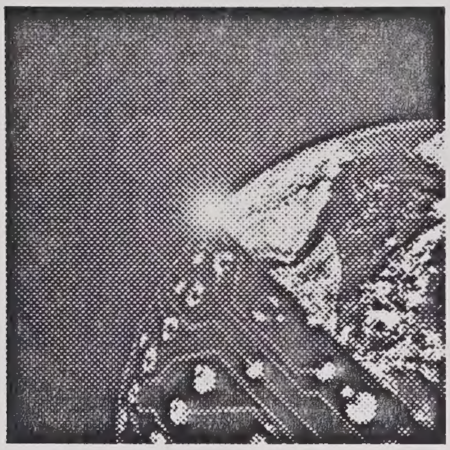

Internetworking Futures

Douglas E. Van Houweling
Vice Provost for Information Technology
University of Michigan
Chairman, Advanced Network & Services Board of Directors

BIOGRAPHICAL NOTES

Douglas E. Van Houweling
Vice Provost for Information Technology
University of Michigan

Douglas E. Van Houweling is Vice Provost for Information Technology at the University of Michigan. He is responsible for managing the University's central computing and telecommunications activities and for coordinating all institutional activities in the information technology arena. The Vice Provost reports directly to the Provost and Vice President for Academic Affairs, Gilbert R. Whitaker. Professor Van Houweling holds faculty appointments in the University of Michigan Business School in Information Systems and in the College of Literature, Science and the Arts in the Department of Political Science.

The overall mission of the Vice Provost for Information Technology is to ensure an information technology environment which enhances the University's distinction in teaching, research, and public service. To carry out this mission, Van Houweling has direct responsibility for the Information Technology Division, which includes Consulting and Support Services, Network Systems, Research Systems, Instructional Technology Systems, University Information Systems, and Resource Administration units.. While the combined budget of these units exceeds seventy million dollars annually, an even larger set of information technology activities are carried out by the many units of the University, and the Vice Provost has responsibility for coordinating these activities as well. In addition to rapidly expanding services and facilities, the University's focus over the last few years has been integration of information technology facilities through institution-wide provision of support, networking, common software, and applications.

Van Houweling came to Michigan from Carnegie-Mellon University in Pittsburgh where he was Vice Provost for Computing and Planning from 1981 until 1984. In this capacity, he initiated and directed Carnegie-Mellon's Andrew project to enable broad use of personal computer workstations in a networked environment.

He has also been active in interuniversity initiatives, serving on the EDUCOM Board and playing roles in establishing numerous initiatives to establish cooperative information technology efforts among universities. Van Houweling was a founder of EDUCOM's UNIX Task Force, EDUCOM's Networking and Telecommunication Task Force, and the Interuniversity Consortium for Educational Computing. He is on the Board of Merit Network, Inc. a Michigan state-wide computing network. Under his leadership, Merit, in partnership with IBM, MCI and the Michigan Strategic Fund, has responsibility for operation and management of the NSFNET backbone network nationwide. In 1990, he became Chairman of the Board of Advanced Network and Services, Inc., a not-for-profit organization supplying network services nationally. ANS now provides the common network infrastructure through which the NSFNET backbone and other national networking services are implemented.

Before joining Carnegie-Mellon, Van Houweling was at Cornell University from 1970 to 1981 as Assistant Professor of Government. In 1976 he took on the additional responsibility of Assistant Director for User Services in Cornell Computer Services. In

1978, he was named Director of Academic Computing and in 1980 became Director of Academic Computing and Central Computing Services.

Dr. Van Houweling received his undergraduate degree from Iowa State University and his Ph.D. in Government from Indiana University. He has consulted with numerous organizations and businesses and has written many articles on information technology, as well as on urban policies and the modeling of political processes.